YouTube Decade: Cultural Convergence in Recorded Music*

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June 17, 2016

Abstract

Digital technology has the potential to impact the diffusion of new goods both within and across markets. The net effect of technology on globalization is thus an empirical question. We study the role of YouTube in globalizing the market for recorded music. We consider the US, Germany and Austria, exploiting a natural experiment that has blocked official music videos on YouTube in Germany since 2009. We document a causal link between YouTube access and both global and local outcomes. YouTube increases overlap with US weekly top charts, a globalizing effect, but also induces greater chart penetration of domestic music, a local effect. We show that the dual result is driven in part by the dynamics of the market: YouTube increases chart turnover, which expands the market for domestic titles. Our results indicate that global platforms need not advantage global culture.

Keywords: Digitization, Trade, Globalization, Media, Superstars, Natural Experiment
JEL No.: L82, O33, D83

*The authors gratefully acknowledge the financial support of this research by the NET Institute, http://www.NETinst.org. Lisa M. George, Department of Economics, Hunter College, 695 Park Ave., New York, NY 10065. Email: lisa.george@hunter.cuny.edu. Christian Peukert, Chair for Entrepreneurship, University of Zurich, Affolternstrasse 56, 8050 Zürich, Switzerland. Email: christian.peukert@uzh.ch.

1 Introduction

Twentieth century innovations in media technology influenced the adoption and diffusion of new goods, and in some cases the industrial organization of product markets themselves. For example, across countries, differential access to information via mass-media (radio, television, newspapers) explains some variation in diffusion rates of new products (Talukdar et al., 2002; Tellis et al., 2003; Chandrasekaran and Tellis, 2008). Within the US, the diffusion of television (and television advertising) contributed to rising household debt linked to automobile purchases (Baker and George, 2010), and to greater penetration of national over local beers (George, 2009). By reducing the cost of product discovery for some goods relative to others, or by reducing the cost of reaching consumers for some firms relative to others, media technology can have broad impacts on product markets.

Digital technology and the internet have similarly influenced relative diffusion rates of new products and the organization of industries. For example, Prince and Simon (2009) find that the internet speeds adoption rates of popular relative to less popular products, creating what has come to be known as "superstar" markets. The explanation for this and related findings is often that consumers interpret popularity as a signal of quality (Hendricks et al., 2012), which is enhanced by social interactions (Chevalier and Mayzlin, 2006; Susarla et al., 2012) and automated recommendations (Oestreicher-Singer and Sundararajan, 2012).

The tendency for technology to promote concentration and superstar markets is offset by two important competing forces. When horizontal differentiation is important, popularity signals can be relatively more effective for niche products (Tucker and Zhang, 2011), increasing demand for goods in the "long tail" relative to those with mass appeal. In addition, unlike media innovations of the twentieth century, digitization has also brought about substantial cost reductions on the supply side, impacting inventory, distribution, and production. Falling costs are especially important for digital products. As a result, online retailers are able to offer greater variety – including niche titles – (Brynjolfsson et al., 2003), and firms have greatly expanded the number of musical works, movies and books coming to market (Waldfogel, 2012; Aguiar and Waldfogel, 2016; Waldfogel, forthcoming; Waldfogel and Reimers, 2015).

The strategic consequences of digitization for product markets has driven a growing literature interested in understanding the distribution of sales *within* markets. A key focus thus far has been documenting the emergence of superstars and/or longer tails that arise from the balance of these offsetting forces (Brynjolfsson et al., 2011; Zentner et al., 2012; Ordanini and Nunes, forthcoming). The effects of the internet on product diffusion *across* markets is less well understood, and much more controversial. In the EU, superstar markets are synonymous with globalization and US dominance, fueling regulatory concern and litigation. The offsetting forces for niche products seem nearly beside the point. The spread of digital platforms likewise exacerbates long-standing concerns regarding US dominance in movies, music and other cultural goods.[1]

Yet evidence on the globalizing effect of digital technology remains surprisingly limited. Trade research does show a positive relationship between growth in the number of domains registered in a country and export growth (Freund and Weinhold, 2004), while a preference for local content and products persists (Blum and Goldfarb, 2006; Hortacsu et al., 2009; Burtch et al., 2014; Agrawal et al., 2015; Lin and Viswanathan, 2016). The best empirical evidence regarding cultural products available in Ferreira and Waldfogel (2013) points to persistent and even growing sales of domestic music and stable export shares in the digital era. Their study, however, ends in 2007, before distribution platforms fueled by social interaction and recommendation engines such as iTunes, YouTube and Spotify had fully developed.[2] The globalizing effect of digitization in markets for cultural goods remains an open question.

This paper studies the role of YouTube in globalizing the market for recorded music. We ask whether the offsetting forces supporting both global superstars and niche artists in a longer tail has lead to more or fewer similarities across countries than were present at the start of the YouTube era. We consider not only net effects, but study how the platform impacts the distribution of global and domestic artists.

Using data on weekly top singles charts from 2005 into 2013 in Germany, Austria and the US,

[1] A recent summary of globalization concerns in Europe can be found at `http://www.nytimes.com/2016/06/02/technology/why-the-world-is-drawing-battle-lines-against-american-tech-giants.html`.

[2] Data from the Recording Industry Association of America shows that the digital share (paid downloads and streaming) of recorded music revenue has grown from less than 20% in 2007 to about 60% in 2012.

we show causal links between access to music on YouTube and trends in recorded music sales. We find that YouTube increases overlap with US weekly charts, a globalizing effect. But at the same time, YouTube increases the penetration of domestic music on top charts. The process is driven in part by the dynamics of the market: YouTube increases chart turnover, with stronger effects outside the top ten titles. Higher turnover expands the market for domestic products. Our results suggest limits to the globalizing role of international superstars through music platforms and a persisting market for niche works. The magnitudes of our results indicate that YouTube will not displace local culture.

YouTube is well suited to studying the impact of digitization on the distribution of sales within and across markets. Nowhere do the conflicting global and local forces of digitization play out more dramatically than on YouTube, where over a billion global users access more than 6 billion hours of video each month. YouTube now serves over 75 localized markets in 61 languages, with 60% of viewers residing in non-English speaking countries. YouTube marketers emphasize the platform's global reach, reporting that over half of views originate outside of the creator's home country. But superstar effects clearly also play a role on the platform, as worldwide YouTube viewing is highly concentrated among top videos.[3]

The context for our analysis is the 2009 launch of YouTube's partner program, which culminated in major record labels making official versions of their music video libraries freely available on YouTube. The program eased the litigious "takedown" phase of YouTube's development that had handicapped the platform's growth in the years after its 2005 founding. Over the course of a few months in 2009, YouTube became the most trafficked music site in the US.[4]

Through the "Content ID" technology, all user videos are digitally matched to YouTube's library prior to release. When uploads contain copyrighted material, rights holders are offered the choice of blocking the infringing video or "monetizing" the content by sharing revenue from

[3]A widely covered report indicated that the top 30% of videos receive 99% of viewing. See media coverage here: `http://goo.gl/Z2DNxM`; original blog post at `http://youtube-global.blogspot.com/2011/04/mmm-mmm-good-youtube-videos-now-served.html`.

[4]See, for example, `http://techcrunch.com/2010/01/13/youtube-vevo-overtake-myspace-music/`

advertisements. In testing, YouTube reported over 90% of rights holders chose monetization.[5] With full-scale implementation across all the major record labels in late 2009, YouTube's transformation to a music distribution platform was complete. Today, about 30% of YouTube videos are music videos accounting for over 40% of total viewing across all categories.[6]

We focus our research on the US, Germany and Austria. We make this choice for both policy and practical reasons. On the policy side, European countries have long-standing interest in preserving cultural heritage through activist trade policies, especially against US influence (Ferreira and Waldfogel, 2013; Hervas-Drane and Noam, 2013). From a practical side, we study Germany and Austria in particular because a music rights dispute kept official music videos (and most unofficial ones) off of German YouTube beginning in April 2009, i.e. during the platform's transformative period. YouTube was not restricted in Austria, which experienced the full effects of YouTube's growth and appeal. Comparisons between Austria and Germany, two countries that otherwise share history, culture and technological circumstances, provides quasi-experimental conditions for our analysis. These comparisons offer stronger identification than is typically available in the literature.

In addition to linking distinct threads of the digitization literature that consider within-market and cross-market diffusion, we contribute to a rich literature on how technology and social media impact the distribution of sales in the market for recorded music (Dewan and Ramaprasad, 2012; Chen et al., 2015; Aguiar and Waldfogel, 2015; Ordanini and Nunes, forthcoming; Wlömert and Papies, forthcoming). We also add a long-run perspective to a recent literature on YouTube itself (Hiller, 2016; Kretschmer and Peukert, 2016), focusing on converging consumption patterns rather than sales cannibalization.

[5] See `https://googleblog.blogspot.com/2008/08/making-money-on-youtube-with-content-id.html`.

[6] For initial Google reports on the effects of Content ID, see `https://googleblog.blogspot.com/2008/08/making-money-on-youtube-with-content-id.html`. For news on the success of the YouTube partnership with UMG, Sony and EMI through the Vevo service, see `http://www.prnewswire.com/news-releases/vevo-was-most-trafficked-us-entertainment-music-web-network-in-december-2009-81347087.html`. Warner Music Group negotiated a separate deal with YouTube during this period. The limited access to Warner titles on YouTube through early 2009 is exploited to study the sales effect of YouTube in (Hiller, 2016). Youtube official YouTube statistics here: `https://www.youtube.com/yt/press/statistics.html` and `http://expandedramblings.com/index.php/youtube-statistics/3/`.

More broadly, our findings point to effects of digitization beyond our specific empirical setting. In the same way that music videos on YouTube provide information about product characteristics that translates into sales of recorded music (Kretschmer and Peukert, 2016), search engines, content aggregators, app stores, and crowdfunding platforms all provide information about product attributes that translate into demand for tradable goods. Although trade costs vary considerably across digital and non-digital products, the notion that the internet can simultaneously trigger imports and domestic consumption through market-expanding effects has important implications for firm strategy and policy. Extension of the long-tail and superstar framework to global markets is a promising area for future research.

2 Data and Empirical Strategy

2.1 Experimental Setting

We identify the effects of YouTube on the market for music by exploiting a contract dispute with the German rights management agency GEMA (Gesellschaft für Musikalische Aufführungs- und Mechanische Vervielfältigungsrechte, or Society for Musical Performing and Mechanical Reproduction Rights) that has kept official music videos off of YouTube in Germany since April 2009. The history and nature of the dispute between YouTube and GEMA has been well-covered in music news and in the economic literature.[7] Media surveys of the most viewed music videos indicate that over 95% are not accessible within Germany.[8] The timing of the blockade in Germany coincides with a major worldwide expansion of YouTube as a music platform. In April 2009, YouTube announced an agreement with Universal Music Group that allowed users to upload videos containing Universal content. In September 2009 YouTube reached a similar deal with Warner Music. In December 2009, YouTube launched its official music site with the VEVO partnership between Uni-

[7] See, for example, `http://www.ft.com/intl/cms/s/0/5bb2092e-117e-11e3-a14c-00144feabdc0.html#axzz3C9p8fdZK` and also Kretschmer and Peukert (2016).

[8] See, for example, `http://apps.opendatacity.de/gema-vs-youtube/en` and `http://www.sueddeutsche.de/digital/streit-zwischen-youtube-und-gema-diese-kultur-ist-in-deutschland-leider-nicht-verfuegbar-1.1584813`.

versal Music Group, EMI and Sony. At the end of 2009, YouTube was reported to be the top music platform in the US.[9] Germany was excluded from all of these YouTube developments and is simply not the hub for global music and music culture in Germany that it has elsewhere become.

Our research hypothesis is straightforward: if YouTube promotes globalization, trends in consumption patterns between culturally similar Germany and Austria would be expected to diverge after April 2009 relative to a global comparison group. In other words, if YouTube promotes globalization, music charts in Austria would be expected to show increasing overlap with US top charts relative to German overlap with US charts. If YouTube strengthens the market for domestic artists, the share of Germanic titles on German charts should increase in Germany relative to Austria after the YouTube ban. We can identify other YouTube effects on the music market through similar analysis.

We study the YouTube blockade in Germany as a discrete event in April 2009. However because the YouTube platform was developing over the course of the year, with long-term impact, we might expect gradual effects over time. So we focus our identification on both levels and trends in music charts.

2.2 Data

The basic data for our study are weekly popular music singles singles charts for the US, Germany and Austria from April 2005 – February 2013. The start date coincides with the beginning of the YouTube era.[10] We end our analysis in February 2013 due to changes in the US Billboard Hot 100 charts that affect our identification strategy.[11]

Data for Germany and Austria comes from the official website of GfK Entertainment, the organization which collects sales data for the German industry association Bundesverband der Musikindustrie (www.charts.de). GfK reportedly covers 90% of all brick-and-mortar retail, online

[9] For background on the Universal partnership, Warner agreement and Vevo launch, see for example: `https://youtube.googleblog.com/2009/04/announcing-vevo-partnership-with.html`, `https://youtube.googleblog.com/2009/09/warner-music-comes-back-to-youtube.html`, and `http://techcrunch.com/2010/01/13/youtube-vevo-overtake-myspace-music/`, respectively.

[10] See `https://en.wikipedia.org/wiki/Me_at_the_zoo`.

[11] See `http://www.billboard.com/biz/articles/news/1549766/billboard-charts-add-youtube-views`.

retail, and digital distribution channels in Germany. Data for the US is taken from Billboard.com's "Hot 100", the dominant and standard source for music sales data. We observe the top 75 singles in all three countries, so restrict attention to these titles. While the focus on the most popular songs does not allow us to consider the very long tail of the music market, chart titles account for a high share of music sales and music listening.[12]

We define three dependent variables. The first is the share of overlapping titles in the top 75 or top 10 weekly singles charts in Germany, Austria and the US. To abstract from short-term time variation in music release, we consider overlap of titles each week with corresponding titles over three weeks (current week +/- 1). We refer to this measure as 3-week overlap and it is our primary measure of globalization.

Second, we consider YouTube's effect on the share of domestic music on top charts. For this analysis, we classify songs as domestic if the song appears at any point on the German or Austrian top 75 charts, but not on US or other European (French, Italian, Spanish, Swiss or Dutch).[13] The vast majority of songs we classify in this way are German language songs performed by German or Austrian bands. The domestic share is our primary measure of localization.

Third, we measure the share of hits that persist on music charts for a three week period in each country. Chart persistence can be seen as measuring the importance of superstars, capturing how many weeks of new music must transpire before new titles replace existing ones in weekly sales. Persistence also captures market-expansion effects, as greater turnover indicates more work reaching top sales levels. Understanding persistence of global superstars along with the flow of domestic titles together can illustrate the globalizing role of YouTube as a music platform.

[12]Detailed sales data covering the top 1000 most grossing songs over a period of 9 weeks in Germany and Austria (Kretschmer and Peukert, 2016), shows that the top 75 songs account for 64% of the cumulative sales across the top 1000 in Germany, 84% in Austria. Sales of the top 10 songs account for 32% and 45%, respectively. The difference between Germany and Austria is partly due to the smaller size of the Austrian music market. The Austrian data actually includes just under 400 unique songs per week, because not more songs are sold at least once in a given week – either physically or digitally. Popularity measured in sales is highly correlated with popularity measured in consumption. Data from Last.fm, a service that tracks music plays of some 90 million users across the globe, indicates that the top 75 of the top 1000 artists account for 47% of total listening, the top 10 artists account for 19%. See `http://www.last.fm/bestof/2011/artists`.

[13]Data for the Swiss, Italian, Dutch and Spanish charts comes from the same source as data for the German and Austrian charts. Data for France comes from www.lescharts.com.

Table 1 summarizes the primary dependent variables in our study. The unit of observation is the country-week level. The top portion of the table includes measures over the top 75 weekly singles, the lower portion covers only the weekly top 10.

The share of titles appearing in Austria that also appear in Germany over a three week window is 75.14%, with a rather narrow range (standard deviation of 4.62%). Overlap between Germany and the US is much lower, 20.07%, with the Austrian average slightly higher at 21.80% The domestic content share averages 21.01% in Germany (standard deviation 6.83%) and 17.41% in Austria (standard deviation 4.8%) over the sample period. Turnover in Austrian charts is somewhat slower than in Germany, with 3-week persistence of 79.71% versus 76.17% of titles, respectively.

The bottom panel of the table shows comparable measures for the weekly top 10. The overlap or convergence measures are qualitatively similar to results for the top 75. The domestic share of the top 10 weekly singles is much lower for both countries than for the top 75 at 2.53% for Germany and 5.31% for Austria. Turnover on the top 10 is also higher (persistence lower) than on the top 75, with the average difference between Germany and Austria close to zero.

3 Results

3.1 Descriptive Evidence

Before turning to our econometric analysis, we present a few simple illustrations of the music market in Germany, Austria and the US relevant to our analyses. Figure 1 plots three-week overlap in popular music sales charts between Germany and Austria from 2005-2013. A simple linear trend overlays the scatterplot. German and Austrian music sales are converging over this time period, increasing from 74.8% overlap in 2005 to 77.7% in 2013. Digitization likely accounts for some of this overall trend.

Figure 2 shows a corresponding scatterplot of German-US and Austrian-US overlap. The dark (blue) line shows the share of titles on the top 75 list each week that appear on both the US and German charts. The pale (orange) line shows the corresponding share for US and Austria. Music

sales in both Germany and Austria are converging toward US charts, with a pronounced upward trajectory in both countries. Austrian overlap with US charts is slightly higher throughout the sample period. There is substantial weekly variation in overlap, and no clear trend in the gap between the Austria-US overlap and German-US overlap is visible in the chart.

The two figures illustrate some relevant facts about music markets. Overlap of chart titles between Germany, Austria and the US is lower than might be expected given the scope of technological change in music markets. This is the conclusion of Ferreira and Waldfogel (2013) which show only modest US imports on European charts. Overlap between German and Austrian charts is much higher, above two thirds in most weeks. The link of culture and language that is the basis for our identification strategy shows through in the figure.

We can investigate the nature of cultural convergence by examining the domestic share of titles on German and Austrian charts. Figure 3 plots the domestic share of titles in Germany and Austria over the sample period. As above, the dark (blue) line shows the 3-week average in Germany and the light (orange) line shows Austrian 3-week average. The domestic share is declining in both countries through most of the sample period, leveling off somewhat after 2009. Over the 422 sample weeks, the German domestic share slightly exceeds the Austrian share in most weeks, averaging 20.6% of titles compared to 17.3% in Austria. The gap between Germany and Austria visibly shrinks after 2009.

As a final look at the raw data, we consider the share of titles persisting at least three weeks on the top charts in Germany and Austria. Figure 4 plots 3-week chart persistence in Austria and Germany. Persistence is higher in Austria than Germany in the years before the blockade, averaging 82.1% of songs compared to 74.9% of titles in Germany. Although weekly variation makes visual patterns difficult to identify, persistence in Austria drops and persistence in Germany rises starting in 2009, with three week survival percentages close to 77% in both countries 2009-2013.

3.2 Analytic Results

This section offers formal tests of the effects suggested in the figures above. For each of our independent variables, we consider both the effect on the top 75 weekly hits, plotted above, and also on the weekly top 10. Restricting our analyses to the most popular music at the top of the charts helps to isolate YouTube's impact on global superstars. For each independent variable we consider three specifications.

The first includes a Germany indicator variable, an indicator for the YouTube blockade period, and a blockade-country interaction that indicates whether the blockade had a differential effect on Germany. This specification is useful because it allows us to investigate globalization separately in Germany, which experienced a YouTube blockade, and Austria, which experienced the full extent of YouTube expansion. High week-to-week variation in the independent variables limits the inference that can be made from this model. In our second specification we include weekly dummy variables. In a third specification, we add a weekly time trend, alone and interacted by country and the YouTube blockade. This specification allows a more robust control for differential trends across countries before the YouTube blockade.

3.2.1 Global Effects

We first estimate YouTube's impact on weekly overlap with US top charts. We consider this to be a first-order measure of globalization. Results for the top 75 charts are reported in table 2. Results for the top 10 singles are reported in table 3.

The constant term in columns (1) indicates that Austrian overlap with US top 75 charts before the blockade is 18.6%. The Germany indicator shows that US overlap is slightly lower than Austrian overlap before the blockade period by about 1.45 percentage points or 1 song. The blockade dummy shows that average weekly overlap between Austria and the US increases after the blockade by 6.5 percentage points from a base of 18, or close to 5 songs. The interaction term is close to zero and not statistically significant, indicating that the globalizing pattern apparent in the blockade period for Austria is not different in Germany.

Estimates are more precise when we add weekly indicator variables in column (2) to better control for the weekly variation apparent in figure 2. The average effect of the YouTube blockade cannot be identified in this specification, but we can see that convergence is lower in Germany compared to Austria by .56 percentage points, or about one song every two weeks. To further control for the possibility of different trends in Germany and Austria pre-dating the YouTube era, we include in column (3) a weekly time trend, alone and interacted with country and blockade indicators. The results in column (3) confirm the results in column (2), that the globalizing effect of YouTube is reduced in Germany relative to Austria. The magnitude of the effect of the blockade in Germany relative to Austria is larger in column (3) than in columns (1) and (2), but offset by a positive difference in the time trend after the blockade.[14]

Table 3 repeats the analysis considering only overlap among the top ten singles each week. The patterns are broadly similar, but the magnitude of convergence is higher among the very top hits. Austrian overlap with US charts increases by 10 percentage points (more than double) during the blockade period. Overlap is slightly lower in Germany, estimated more precisely with the inclusion of week fixed effects. When we add a country-blockade trend the magnitudes are similar but standard errors rise, and we cannot reject that the difference in overlap among the top ten singles is the same between Austria and the US and Germany and the US.

We interpret tables 2 and 3 as first order evidence of globalization: YouTube contributes to observed convergence with US top singles charts, with larger effects among the very top hits.

3.2.2 Local Effects

We consider next another facet of globalization, the domestic music share of top charts. Tables 4 and 5 shows how the domestic share in Austria and Germany varies across the blockade period. As above, the first column considers a simple OLS model, the second includes weekly dummies and the third both weekly dummies and an interacted time trend. Recall that we define all titles appearing on German or Austrian but not US, French, Italian, Spanish, Swiss and Dutch charts as

[14]The value of the trend variable is 193 in the week when the blockade starts.

domestic titles.

Considering column (1), the negative coefficient on the blockade period indicates that the domestic share falls as YouTube expands, but the Germany-blockade interaction in columns (1) and (2) show that the decline is substantially larger in Germany than Austria. In column (3), we don't find a significant average difference in the domestic share, but the share falls more quickly over time in Germany during the blockade period. Considering the top 10 singles in columns (1) and (2) in Table 5, the average differences between Germany and Austria are not statistically significant. Results in column (3) indicate that the blockade steepens the decline of domestic music in Germany. The magnitude of the effect in both tables suggest that with the beginning of the blockade, the share of domestic music on weekly top charts in Germany is five percentage points lower than it would be had music on YouTube been available.

3.2.3 Dynamics

Our dual result that YouTube cements the market for global superstars at the same time it expands the market for niche domestic titles is consistent with prior findings that technology both promotes superstars and increases sales in the long tail. But given the results above, it is worthwhile considering the mechanism through which digital platforms can promote both local and domestic music. To do this, we measure YouTube's effect on the persistence of music on top charts.

Tables 6 and 7 show the difference in the three-week survival share of top weekly titles in Austria and Germany corresponding to the patterns in Figure 4. The results in column (1) of both tables show that persistence declines in Austria and increases in Germany during the blockade period. The overall effects are smaller among the top ten titles than in the top 75 titles, with a reduction in Austria after the blockade of 5.2 percentage points in the top 75 compared to 2.7 percentage points in the top 10. Persistence increases in Germany by about 7.3 percentage points in the top 75 and 4.5 percentage points in the top 10 charts. Levels and interactions are both highly statistically significant. Results in column (3) show a *negative* average effect in Germany relative to Austria after the blockade (not significant regarding top 10), but the interacted trend is large.

With the beginning of the blockage period, German chart persistence exceeds Austrian levels.

The net effect of YouTube is to increase turnover on top charts, especially outside of the top ten positions. This allows the market for niche domestic titles to expand even with greater dominance of global superstars.

4 Conclusions

The YouTube platform reduces entry costs for local artists at the same time it eases access to global superstars. The net effect is an empirical question. Exploiting a contract dispute that has blocked official music videos in Germany but not Austria since April 2009, we find evidence that YouTube increases penetration of domestic music at the same time it increases overlap with US charts. Dynamics of the music cycle play a role in this dual result, as YouTube increases turnover – especially lower in the charts compared to the very top, which is dominated by global hits.

It is worth stressing that we look only at the top 75 songs each week across countries during the study period. These top songs are important because they constitute a large fraction of music sales and music listening, and because artists unable to reach these levels are less likely to sustain a profitable career. But globalization trend at the very top of weekly rankings does not mean fewer domestic songs are available or played in aggregate. We do not observe the very long tail of music sales and cannot comment on convergence at a more granular level. This is an exciting avenue for future research.

Our results have some implications outside of our empirical setting. It is well known that lower search costs can expand markets generally by reducing net prices faced by consumers, increasing demand. Search models along these lines form the basis of advertising strategy.

But the potential for technology to lower *relative* search costs across different types of goods has remained little explored. Our finding that YouTube, which can be seen as a search tool for music (Hiller, 2016; Kretschmer and Peukert, 2016), increases domestic more than global sales, suggests that any platform that reduces search costs – content aggregators, app stores, crowdfunding platforms, and search engines themselves – can similarly impact global trade flows in ways that

are not yet fully understood. Although physical costs of trade vary considerably across digital and non-digital products, the notion that the internet can simultaneously trigger imports and domestic consumption has important implications for firm strategy and policy that warrant further study.

In closing, it is important to point out that because we do not observe how intensely consumer listen to music on YouTube, but can only measure YouTube's indirect effect on recorded music sales, we limit our study to positive rather than normative effects. However from a welfare standpoint, faster turnover and the dual result of more local music and a simultaneous spread of global superstars in music or any product market can be seen as beneficial developments that increase both variety and quality. This is often not the policy view, but perhaps it should be.

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Table 1: Summary Statistics

	N	Mean	SD	0.05	0.50	0.95
Top 75 Weekly Singles (%)						
Germany-Austria Convergence	392	75.14	4.62	66.67	74.67	82.67
Germany-US Convergence	392	20.07	5.02	12	20	28
Austria-US Convergence	392	21.80	5.26	14.67	21.33	30.67
Germany Domestic Share	392	21.01	6.83	10.67	21.33	32
Austria Domestic Share	392	17.41	4.80	10.67	17.33	26.67
German Chart Persistence	392	76.17	4.44	68	76	82.67
Austrian Chart Persistence	392	79.71	5.04	72	80	86.67
Top 10 Weekly Singles (%)						
Germany-Austria Convergence	392	74.97	11.9	60	70	90
Germany-US Convergence	392	19.31	12.23	0	20	40
Austria-US Convergence	392	20.64	13.55	0	20	50
Germany Domestic Share	392	2.53	5.30	0	0	10
Austria Domestic Share	392	5.31	7.66	0	0	20
German Chart persistence	392	68.34	11.99	50	70	90
Austrian Chart Persistence	392	69.34	11.51	50	70	90

Figure 1: Germany-Austria Overlap 2005-2013

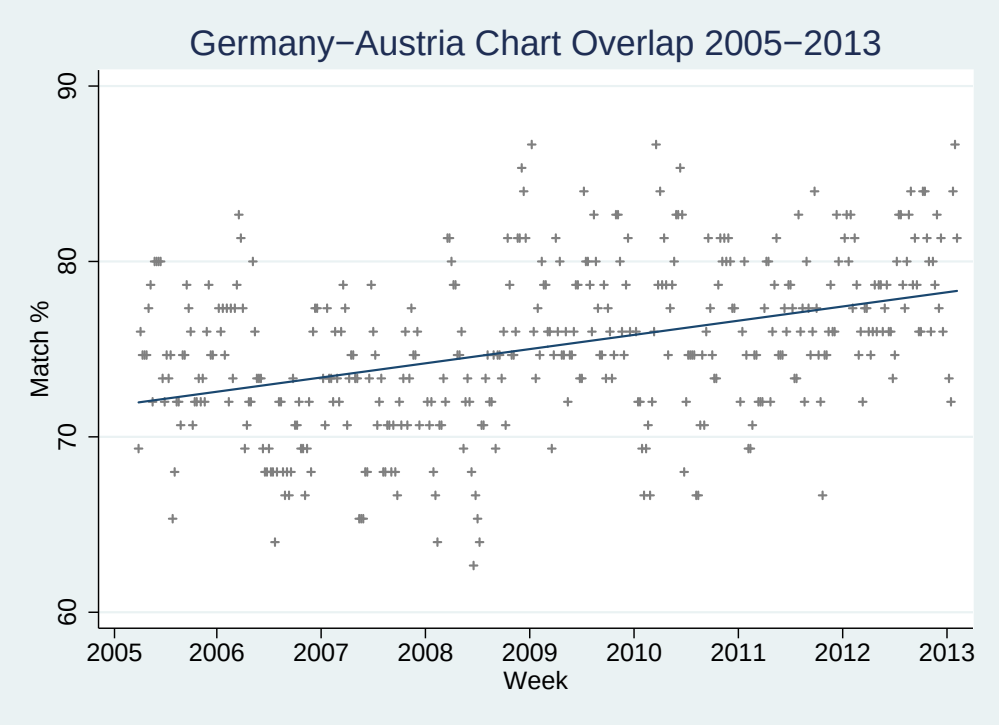

Figure 2: US Chart Overlap 2005-2013

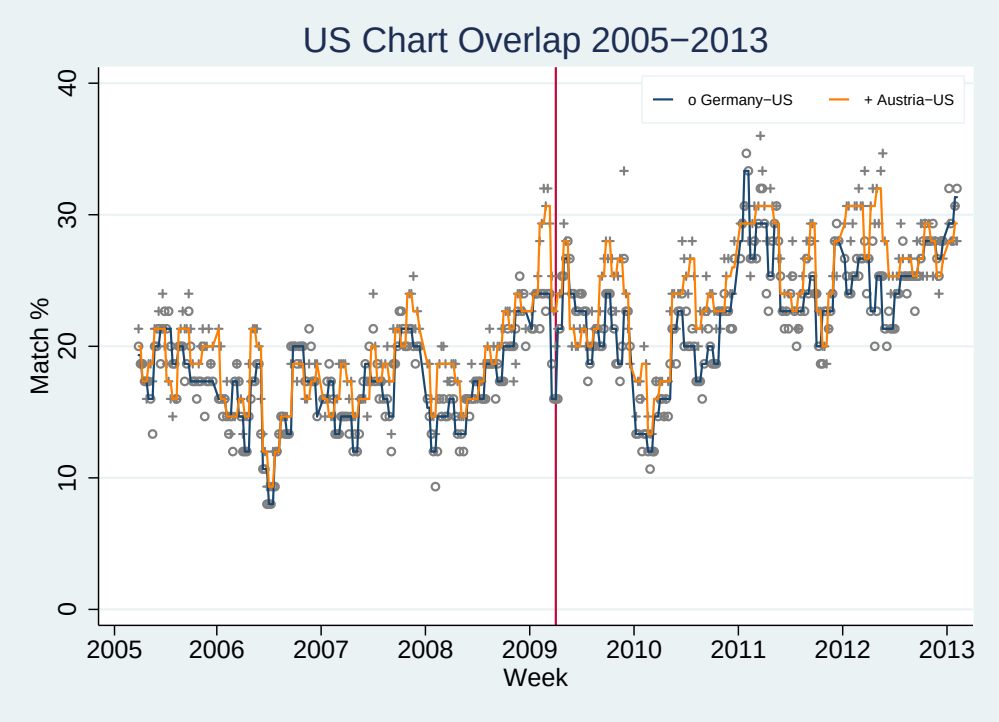

Figure 3: Domestic Music Share 2005-2013

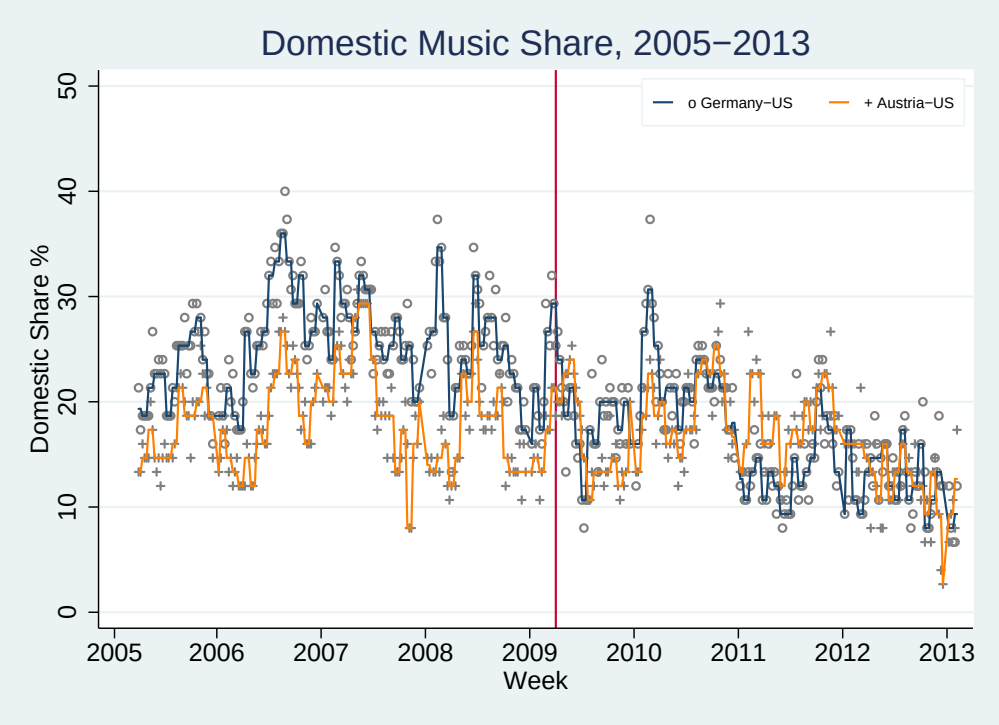

Figure 4: 3-Week Chart Persistence 2005-2013

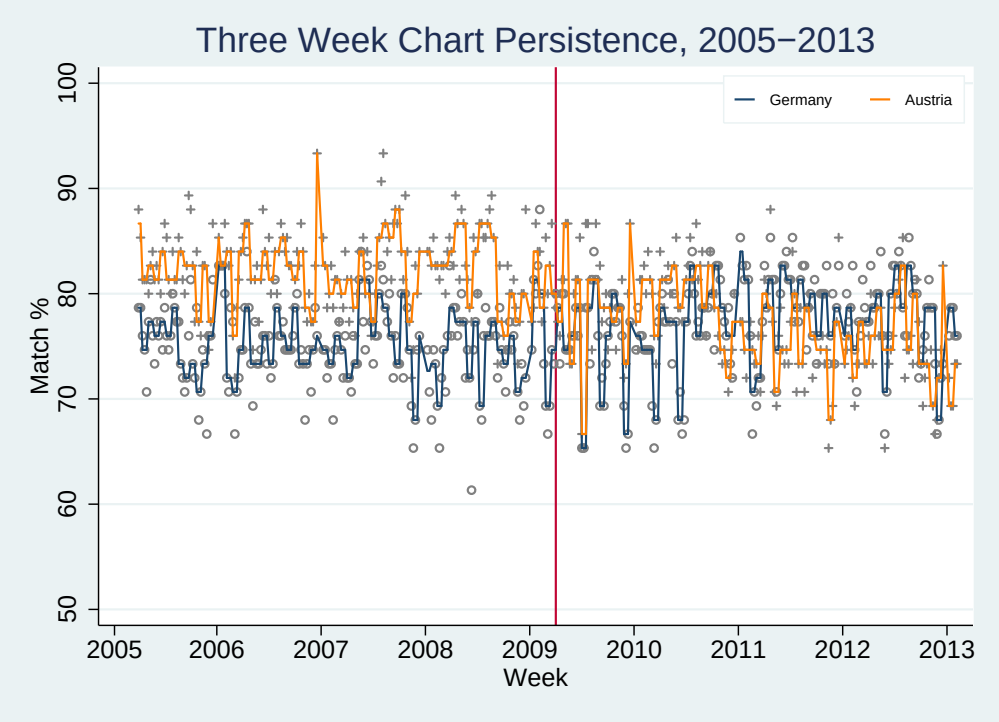

Table 2: Global Effects: US Top 75 Singles Overlap 2005-2013

	OLS	Weekly FE	FE + Trend
	(1)	(2)	(3)
Germany	–1.447**	–1.447**	–.231
	(.365)	(.166)	(.365)
Blockade Period	6.478**		
	(.419)		
Blockade Period x DE	–.563	–.563*	–2.632*
	(.587)	(.265)	(1.322)
Weekly Trend			
Weekly Trend x DE			–.011**
			(.003)
Blockade Period x Weekly Trend x DE			.013**
			(.005)
Constant	18.606**	21.796**	21.796**
	(.269)	(.093)	(.092)
Mean Y	20.93	20.93	20.93
N (Weeks)	784	784	784

Dependent variable is Austrian and German overlap with US top 75 singles.
Robust standard errors: + $p < 0.10$; * $p < 0.05$; ** $p < 0.01$.

Table 3: Global Effects: US Top 10 Singles Overlap 2005-2013

	OLS	Weekly FE	FE + Trend
	(1)	(2)	(3)
Germany	–.553	–.553	1.453
	(1.187)	(.479)	(.961)
Blockade Period	10.175**		
	(1.271)		
Blockade Period x DE	–1.572	–1.572+	–1.776
	(1.719)	(.846)	(3.700)
Weekly Trend			
Weekly Trend x DE			–.017*
			(.008)
Blockade Period x Weekly Trend x DE			.012
			(.014)
Constant	15.628**	20.638**	20.638**
	(.871)	(.298)	(.297)
Mean Y	19.97	19.97	19.97
N (Weeks)	784	784	784

Dependent variable is Austrian and German overlap with US top 10 singles.
Robust standard errors: + $p < 0.10$; * $p < 0.05$; ** $p < 0.01$.

Table 4: Local Effects: Domestic Share of Top 75 Singles 2005-2013

	OLS	Weekly FE	FE + Trend
	(1)	(2)	(3)
Germany	7.095**	7.095**	6.285**
	(.489)	(.305)	(.542)
Blockade Period	–1.835**		
	(.477)		
Blockade Period x DE	–7.095**	–7.095**	–.684
	(.707)	(.470)	(2.134)
Weekly Trend			
Weekly Trend x DE			.007
			(.004)
Blockade Period x Weekly Trend x DE			–.024**
			(.008)
Constant	18.312**	17.408**	17.408**
	(.338)	(.166)	(.164)
Mean Y	19.21	19.21	19.21
N (Weeks)	784	784	784

Dependent variable is Austrian and German domestic share of weekly top 75 singles.
Robust standard errors: + $p < 0.10$; * $p < 0.05$; ** $p < 0.01$.

Table 5: Local Effects: Domestic Share of Top 10 Singles 2005-2013

	OLS	Weekly FE	FE + Trend
	(1)	(2)	(3)
Germany	–2.312**	–2.312**	–4.215**
	(.747)	(.640)	(1.188)
Blockade Period	–1.062		
	(.770)		
Blockade Period x DE	–.953	–.953	4.800
	(.931)	(.851)	(3.060)
Weekly Trend			
Weekly Trend x DE			.016+
			(.009)
Blockade Period x Weekly Trend x DE			–.028*
			(.013)
Constant	5.829**	5.306**	5.306**
	(.605)	(.301)	(.301)
Mean Y	3.92	3.92	3.92
N (Weeks)	784	784	784

Dependent variable is Austrian and German domestic share of weekly top 10 singles.
Robust standard errors: + $p < 0.10$; * $p < 0.05$; ** $p < 0.01$.

Table 6: Dynamic Effects: Top 75 Three-week Chart Survival 2005-2013

	OLS	Weekly FE	FE + Trend
	(1)	(2)	(3)
Germany	–7.109**	–7.109**	–6.541**
	(.397)	(.297)	(.573)
Blockade Period	–5.207**		
	(.438)		
Blockade Period x DE	7.254**	7.254**	–8.724**
	(.619)	(.500)	(2.085)
Weekly Trend			
Weekly Trend x DE			–.005
			(.005)
Blockade Period x Weekly Trend x DE			.053**
			(.008)
Constant	82.271**	79.707**	79.707**
	(.272)	(.176)	(.162)
Mean Y	77.94	77.94	77.94
N (Weeks)	784	784	784

Dependent variable is the Austrian and German share of titles remaining at least 3 weeks among top 75.
Robust standard errors: + $p < 0.10$; * $p < 0.05$; ** $p < 0.01$.

Table 7: Dynamic Effects: Top 10 Three-week Chart Survival 2005-2013

	OLS	Weekly FE	FE + Trend
	(1)	(2)	(3)
Germany	–3.216**	–3.216**	–.404
	(1.192)	(.903)	(2.057)
Blockade Period	–2.674*		
	(1.156)		
Blockade Period x DE	4.511**	4.511**	–8.860
	(1.673)	(1.361)	(6.079)
Weekly Trend			
Weekly Trend x DE			–.024
			(.016)
Blockade Period x Weekly Trend x DE			.057*
			(.024)
Constant	70.653**	69.337**	69.337**
	(.828)	(.480)	(.478)
Mean Y	68.84	68.84	68.84
N (Weeks)	784	784	784

Dependent variable is the Austrian and German share of titles remaining at least 3 weeks among top 10.
Robust standard errors: + $p < 0.10$; * $p < 0.05$; ** $p < 0.01$.