

Measuring Crime



REPORT by Mathias Bug and Kristina Meier

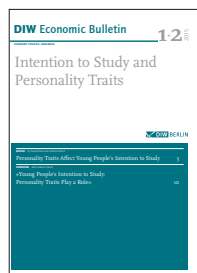
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How to Obtain a More Accurate Picture of Crime through Crime Statistics — Proposals and Methods

By Mathias Bug and Kristina Meier

This report aims to show the distribution of crime in Germany. For this, police crime statistics (polizeiliche Kriminalstatistik – PKS) are treated so that they integrate dark figures (unreported crime) of crime types along with their specific grade of burden. The different treatments are based on own recent survey data. Two major trends are confirmed by both treatment methods: First, there is a north-south divide, with the northern regions experiencing a far higher risk of crime. Second, rural/urban differences can be accounted for by the higher levels of everyday crime that affect citizens of towns and cities. These slight differences and changes are more evident and meaningful in state-to-state comparisons rather than looking at Germany as a whole.

To¹ date, police crime statistics (PKS) in Germany, compiled by the Federal Criminal Police Office (Bundeskriminalamt, BKA), have taken the form of a list of the main categories of offenses with relevant figures for each one. In this form, the distribution of offenses across Germany is depicted at federal state level only (as well as by city with populations exceeding 200,000), and the overall picture consists of little more than total raw case numbers.²

For some time now, however, both the economic research³ and international criminological research community have been asking the same question: whether the method applied hitherto — mere totaling of individual criminal offenses reported to the police — enables the social burden from crime to be analyzed at all. In light of this, the present paper will outline possible methods of combating the two main criticisms leveled at police crime statistics in Germany⁴ — i. e., the missing

¹ This article was written as part of the research project WISIND, *an economic security indicator for Germany*. It is financed by the German Federal Ministry of Education and Research as part of their "Social Dimensions of Security Research" funding line. The WISIND project and WISIND data were developed in close cooperation between Martin Kroh, Johannes Rieckmann, Eric van Um, Nina Wald, and Nathan Fiala. The authors would also like to thank Enrique Fernandez, Martina Kraus, Jan-Lucas Schanze, and Bartosz Walenda for their support throughout this process. Excerpts from this *Economic Bulletin* report can be found in M. Bug and K. Meier, "Herausforderungen bei der Messung von Kriminalität," *DIW Roundup* (2014), accessed December 2, 2014, http://www.diw.de/sixcms/detail.php?id=diw_01.c.466936.de (in German only).

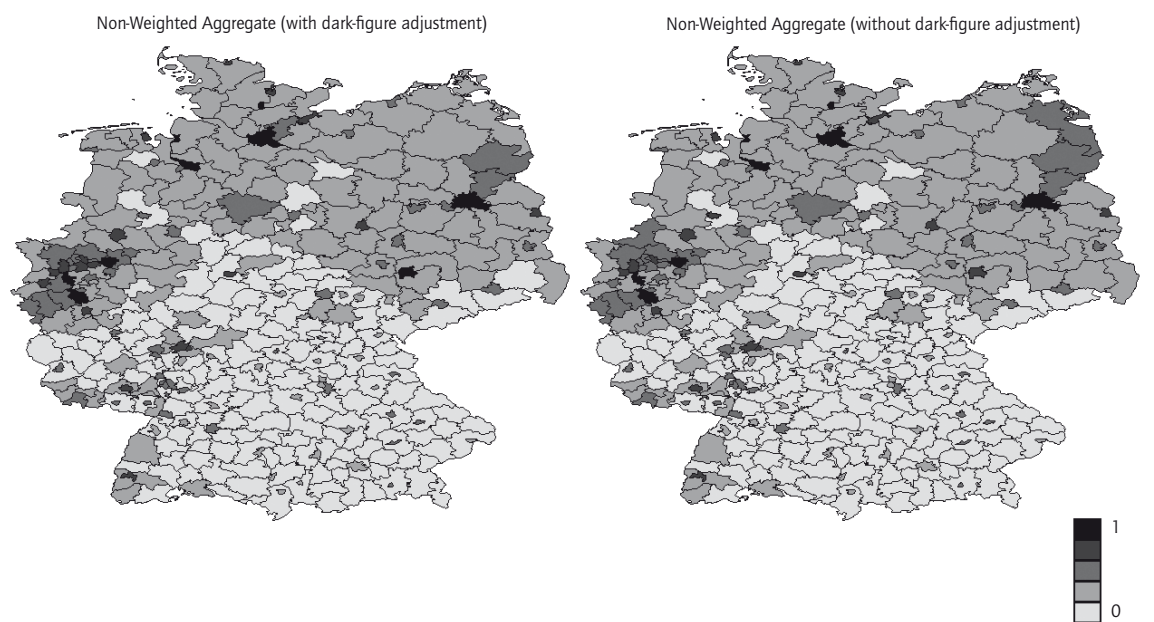
² Federal Criminal Police Office (2010-2013): *Jahrbuch Polizeiliche Kriminalstatistik*. For a critical review of this, see H. Entorf, "Anmerkungen zur Herleitung eines schadensgewichteten Index der Kriminalitätsentwicklung," *MPRA Paper*, no. 56626, 3 (2014).

³ For an overview, see Entorf, "Anmerkungen." See also: Heinz, W.: Judicature. In: RatSWD: *Building on Progress*, (2010): 1197-1216, last accessed January 12, 2015, http://www.ratswd.de/publ/KVL/Building_on_Progress_Band_II.pdf. Rat für Sozial- und Wirtschaftsdaten (2009): *Optimierung des bestehenden kriminalistischen Systems in Deutschland*. Nomos. Baden Baden.

⁴ An overview of the status quo in research on crime rate assessment can be found in S. Eifler and D. Pollich, eds., "Empirische Forschung über Kriminalität" (2015). A brief overview can be found in Bug and Meier, "Herausforderungen."

Figure 1

Police crime statistics 2010-2013, with and without dark figure correction



Source: Bundeskriminalamt (2010-2013): Polizeiliche Kriminalstatistik. Bug, M.; Kroh, M.; Meier, K.; Rieckmann, J.; van Um, E.; Wald, N. (2015): WISIND-data files: Crime Survey and Weighting. Calculations by DIW Berlin.

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The dark figure correction did not lead to major changes in the measured crime burden.

dark figure of crime⁵ and the lack of individual weighting or classification of criminal offenses.⁶ The alternative methods presented give a more accurate picture of the burden to society from everyday crime.

In order to take account of the very heterogeneous population distribution across the individual German federal states and in Germany as a whole, the considerations here are based on an aggregate of criminal offenses

es at administrative district level. This approach allows us to see urban/rural differences, as well as differences between individual rural districts when comparing crime statistics (see Figure 1).

Crime Risk Assessment – Gap between Reported and Non-Reported Crime (the “Dark Figure” of Crime)

The central database used to calculate crime rates is the German Police Crime Statistics, which includes data on the number of attempted and actual crimes reported to the police in the given reference period.

The problem with police crime statistics in Germany, however, is — as mentioned above — they only include officially reported criminal acts.⁷ Figure 1 shows the aggregate distribution of reported offenses under “Non-Weighted Aggregate (without dark-figure adjustment).” For certain forms of crime, evidence of considerable gaps between reported and unreported offenses exist. Errors on the part of law enforcement agencies also play a role

⁵ C. Birkel, “Gefährdungen durch Kriminalität in “offiziellen” Zahlen und subjektivem Erleben der Menschen: Polizeiliche Kriminalstatistik und Dunkelfeldbefragungen,” in *Wie die Statistik belegt...*, ed. J. Röllgen, 5th SIRA Conference Series, (2014): 23-43, last accessed November 24, 2014, <http://athene.bibl.unibw-muenchen.de:8081/node?id=92194>. C. Birkel, “Hellfeld versus Dunkelfeld,” in S. Eifler and D. Pollich, *Empirische Forschung über Kriminalität*, (2015): 67-94; J. Stock, “Stand und Perspektiven der Dunkelfeldforschung in Deutschland und international,” in *Festschrift für Wolfgang Heinz*, (Baden-Baden 2012): 317-331; K. Sessar, “Kriminalitätswirklichkeit im Licht des Dunkelfeldes,” in *Festschrift für Wolfgang Heinz*, (Baden-Baden 2012): 262-274; W. Heinz, “Zum Stand der Dunkelfeldforschung in Deutschland,” in *Nationale und internationale Entwicklungen in der Kriminologie-Festschrift für Helmut Kury zum 65. Geburtstag*, eds. J. Obergfell-Fuchs and M. Brandenstein, (Frankfurt am Main: 2006): 241-263.

⁶ Entorf, “Anmerkungen”; H. Spengler, *Ursachen und Kosten der Kriminalität in Deutschland*, PhD thesis, Law and Economics Department, TU Darmstadt (2004), last accessed June 12, 2014, <http://tuprints.ulb.tu-darmstadt.de/531/>.

⁷ Birkel, *Viktimisierungssurvey*.

Box

Crime Statistics in Germany

The following offenses form the data basis of the approach described here: theft (PKS Index ****00 without 440*00), burglary (PKS Index 435*00 and 436*00, as well as 440*00), bodily harm (PKS Index 222000 and 224000), murder and manslaughter (PKS Index 892500).¹ The results shown in this article are based on what is referred to as the *frequency of offense*. These are calculated according to the formula

$$\frac{\text{Absolute number of offenses} \times 100\,000}{\text{Number of inhabitants}}$$

The method used here incorporates all the PKS data collected from 2010 to 2013.

The above-mentioned offenses essentially cover crimes that have a direct impact on the individual and the everyday context and consequently affect the subjective perception of personal security; this type of crime is referred to as everyday crime.² In the period July through September 2014, as part of the

WISIND project, opinion poll company TNS Emnid conducted a representative telephone survey among 12,094 individuals in Germany, who were all asked about their personal experience with crime. Twenty percent of respondents were interviewed on cellphone numbers. The sample is a proportionally representative sample distributed evenly across Germany, with a minimum of 15 participants in each administrative district. A further representative online survey conducted by research institute *forsa* asked 2,532 people to rank the severity of different types of crime.³ The results of these two surveys form the main basis for further calculations using the PKS data shown below.

ihr Einfluss auf die Lebenszufriedenheit in Deutschland," in *Sicherheiten und Unsicherheiten*, eds., H. Hoch und P. Zoche (Lit-Verlag Berlin, 2014): 53–74; here: 58. Indications of this correlation based on a large-scale survey can be found in C. Birkel, N. Guzy, D. Hummelsheim, D. Oberwittler, and J. Pritsch, *Der Deutsche Viktimisierungssurvey 2012*, (2014): 74–78, last accessed December 8, 2014, http://www.bka.de/DE/Presse/Pressemitteilungen/Presse2014/141208_Viktimisierungssurvey2012.html?__nnn=true.

3 Hereby, the main unit was randomly drawn in a multilevel procedure offline and consists of 30,000 people. Our reached sample of 2532 interviewees, includes 517 persons who do not use the internet. They were interviewed via their TV-screen.

1 Federal Police Office, *Jahrbuch Polizeiliche Kriminalstatistik* (2010–2013).

2 To date, however, criminological research has been unable to verify this correlation. D. Hummelsheim and D. Oberwittler, "Unsicherheitsgefühle und

here.⁸ As a general rule of thumb, it can be assumed that, given the extent of the damage and the need for an official police report for compensatory insurance claims, the figure for reported crimes is a more reliable measure of the occurrence of criminal activity than might be expected.⁹ In literature, however, even for violent crimes¹⁰ including homicide,¹¹ official crime statistics have been reported to be of limited reliability as a data source. Here, it must also be borne in mind that the ratio of reported to unreported crime for individual offenses changes over time.¹²

Crime Risk Assessment – The Problem with Crime Statistics

To obtain a more accurate picture of the actual offenses committed in the various administrative districts in

Germany, the authors of this report suggest adjusting the official crime statistics by a calculated estimate of the "dark figure of crime." This approach is based on dark figure studies on victimization experiences conducted among the German population as part of large-scale representative surveys. Even in dark figure studies with large sample sizes, however, the approach used will admittedly involve a certain degree of subjectivity since such studies can ultimately only record whether and how people recall a criminal act, as well as what they are willing to relate in the survey situation.¹³ Another problem with such surveys is the difference between the legal definitions used in official crime statistics and the common understanding of certain forms of crime that are typical of such surveys. Consequently, adjusting crime statistics to factor in the dark figure is somewhat subjective since the adjustment factor is formed on the basis of the subjective perception of victimization (and not on the basis of police reports or even court findings).

Another factor to be taken into account is population differences. For instance, dark figure studies are sub-

8 Birkel, *Viktimisierungssurvey*, 26.

9 Heinz, "Zum Stand," 242.

10 Sessar, "Kriminalitätswirklichkeit," 265.

11 Brinkmann et al., "Fehlleistungen bei der Leichenschau in der Bundesrepublik Deutschland," (1997). In: *Arch Kriminol* 199, 1–12 und 65–74.

12 Kersting and Erdmann, "Analyse," 16–17.

13 Heinz, "Zum Stand," 243f.

Table 1

Estimated dark figure means for 2012 and 2013

	Mean	Standard deviation
Murder and manslaughter ¹	1.8285	
Burglary	5.565	0.039
Theft	2.937	0.128
Bodily harm	4.047	0.721

¹ Calculated on base of a Germany wide study about autopsy mistakes (Brinkmann 1997).

Source: Bundeskriminalamt (2012, 2013): *Polizeiliche Kriminalstatistik*. Bug, M.; Kroh, M.; Meier, K.; Rieckmann, J.; van Um, E.; Wald, N. (2015): *WISIND-data files: Crime Survey. Calculations by DIW Berlin*.

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Especially the dark figures for burglary and bodily harm indicate a substantial share of unreported crime.

ject to a minimum age requirement (normally 16), and participants must not be in prison or institutionalized.¹⁴ Data from dark figure studies are thus not necessarily 100% comparable with PKS crime statistics.¹⁵ Nonetheless, dark figure surveys do produce approximate data that help to offset structural inaccuracies inherent in official crime statistics.

Owing to the aforementioned problems with crime statistics in Germany, the authors of this report were compelled to conduct their own survey for their dark figure calculations (see Box). To do so, a dark figure factor was created as the average of the calculated differences between the PKS and survey results for the years 2012 and 2013 (see Table 1).

The averages, which serve to incorporate the “dark figure” of crime, are calculated uniformly at national level in order to fully utilize the explanatory power of the entire sample. The resultant distribution of observed offenses is shown in Figure 1 under “Non-Weighted Aggregate (with dark-figure adjustment).”

There are only slight differences to the non-adjusted figures. The urban/rural gap remains as apparent as the north-south divide. This means that adjusting the figures for offenses with the highest frequency, i.e., theft and burglary, affects administrative districts equally. In general, it can be said that the effects observed here are less pronounced than the relatively rough scales suggest.

¹⁴ In addition, for reasons of demographic change, the low participation of elderly people who are in need of care is becoming increasingly relevant.

¹⁵ Birkel, *Viktimisierungssurvey* 31; Birkel, “Hellfeld versus Dunkelfeld.”

Criminal Offense Weighting for Crime Risk Assessment: Three Possible Approaches

In addition to the problems related to reported versus unreported crime, when it comes to measuring crime itself there is another issue with the impact crime has on society. Adding up the total number of incidents and weighting them equally is unlikely to give a true indication of the actual risk that crime poses. Instead, what is called for is suitable weighting indexes for individual criminal offenses. Indexes of this type have already been published in other countries, such as the US or UK Peace Index.¹⁶ Both of these are based on five key indicators, appropriately weighted and aggregated. The shortcoming of this type of weighting, however, is its subjectivity. This is not the only conceivable approach, however. Indeed, various other methods are already being used in criminological research.¹⁷ The calculations presented here are essentially derived from the concepts behind these methods. For reasons of comparison, the crime risk indicator is calculated using various weighting methods, which are briefly presented below.

Monetization Weighting

In economic research literature, various monetization approaches exist.¹⁸ Here, the costs resulting from different crimes are estimated, taking into account the financial loss (e.g., due to incapacity to work, treatment costs), as well as — where possible — the emotional impact.

These quantifications enable relative degrees of severity to be calculated. Here, the estimated total damage caused by each offense is compared to the most serious offense (homicide) and the quotient used as the weighting factor.

Opinion-Based Weighting Using a Representative Public Opinion Poll

On the basis of a representative online survey among 2,532 respondents, degrees of severity were calculated in order to categorize individual offenses. Respondents were asked

¹⁶ Institute for Economics and Peace, *Vision of Humanity* (2014), accessed June 12, 2014, <http://www.visionofhumanity.org>.

¹⁷ T. Sellin and M. Wolfgang, *The Measurement of Delinquency*, (New York: Wiley, 1964); L. Riesner et al., *Die biografische Entwicklung junger Mehrfach- und Intensivtäter in der Stadt Neumünster*, Final Report, (Institute of Psychology, University of Kiel, 2012); J. Jäger, T. Klatt, and T. Bliesener, “Gewalt gegen Polizeibeamtinnen und Polizeibeamten,” NRW study by the Institute of Psychology, University of Kiel; Entorf, “Anmerkungen.”

¹⁸ Entorf, “Anmerkungen”; H. Entorf, “Der Wert der Sicherheit: Anmerkungen zur Ökonomie der Sicherheit,” *MPRA Paper*, no. 49690, University Library Munich (2013); Spengler, “Ursachen”; H. Entorf and H. Spengler, *Crime in Europe: Causes and Consequences*, (Springer, 2002); T. Miller, M.A. Cohen, and B. Wiersema, *Victim Costs and Consequences: A New Look*, (Washington, D.C.: U.S. Department of Justice, Office of Justice Programs, National Institute of Justice, 1996), accessed June 12, 2014 <http://purl.access.gpo.gov/GPO/LPS91581>.

to rank ten different offenses according to their relative degree of severity. This was done in two stages: first, respondents were asked to order the offenses according to severity, starting with the most minor (misdemeanor). The second step was to take the ranking from step one and compare the offenses in pairs. The resultant individual weightings were averaged across the entire sample to produce indicator weights for the respective types of crime.

Data-Based Weighting

The third and least subjective approach is purely data-based and uses Item Response Theory (IRT),¹⁹ which has also been used to assess pupil performance in PISA studies, as well as to measure corruption and democracy indexes.

The basic concept behind this method is that it attempts to estimate a latent variable (in this case, the crime risk level) using the severity of various subindicators (here, items). In other words, using the relevant data, the severity of the offense and its relevance for latent risk is ascertained. IRT is essentially the same as calculating a weighted aggregate from individual offense aggregates. However, unlike the latter, IRT does not need a priori assumptions regarding the severity of offenses, but, estimates the severity and relevance based on the data itself using an accepted and reconstructible method. In addition, IRT allows standard errors to be calculated, meaning conclusions can be drawn on the statistical significance of the estimated values. Table 2 shows the weighting that results from the different approaches. The coefficients from the IRT calculation are not to be interpreted in the same way, which is why they are not mentioned explicitly here. They are, however, included in the calculations below.

In all of the weighting methods, the different criminal offenses are placed in the selfsame order of priority.²⁰ As expected, murder and manslaughter are seen as the most severe. An interesting fact, however, is that homicide comes last in the IRT method with regard to relevance to crime risk.²¹ This may be because such extremely rare incidents are likely to be randomly spread

Table 2

Weights of specific crime types

	Monetization Weighting ¹	Opinion-based weighting
Murder and manslaughter	1	0.9055
Burglary	0.014	0.0476
Theft	0.0005	0.0193
Bodily harm	0.0004	0.0114

¹ Based on: Entorf, H. (2014); Entorf, H. (2013) Spengler, H. (2004); Entorf, H., Spengler, H. (2002); Miller T., Cohen, M.A., Wiersema, B. (1996). Calculations by DIW Berlin.

Source: Bug, M.; Kroh, M.; Meier, K.; Rieckmann, J.; van Um, E., Wald, N. (2015): WISIND-data files: Weighting. Calculations by DIW Berlin.

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Both ways of weighting show the same ranking in between crime types.

across the country, meaning they are an unreliable indicator of the crime risk.

Interpreting the Results

Figures 1 and 2 show the main crime risk by administrative district for the period 2010 to 2013, calculated on the basis of the raw PKS data, the figures adjusted for unrecorded crime, and the weighting methods presented here. To make the results more readily comparable, the indicator values for the given weighting methods were all normalized to lie within the interval [0,1].

All the weighting methods show a similar picture with very few surprises. The difference between rural and urban areas is very apparent, and, as expected, the crime risk level far higher in urban regions. This finding clearly shows the need for a more differentiated approach to measuring the crime risk at district level, since these trends are difficult to evaluate if the results are compared on state-level. With the exception of Munich, conurbations also display higher values. It should be noted, however, that the low crime risk seen in Munich is very much in line with the general north-south divide, one of the issues discussed in the PKS yearbooks for the period under observation.²² A slight change in this north-south divide is evident for the monetization method only, with everyday crime being less problematic in Brandenburg, Saxony, and Westfalen in particular. In some parts of Thuringia, Upper/Middle Franconia, and Upper Bavaria, the monetization method revealed a relatively high crime risk.

¹⁹ F.M. Lord, M.R. Novick, and A. Birnbaum, *Statistical theories of mental test scores*, (Reading, MA: Addison-Wesley, 1968). G. Rasch, *Probabilistic models for some intelligence and attainment tests*, (Copenhagen: Danish Institute for Educational Research) expanded edition (1980) with foreword and afterword by B.D. Wright. (Chicago: The University of Chicago Press, 1960/1980). P.F. Lazarsfeld and N.W. Henry, *Latent Structure Analysis* (Boston: Houghton Mifflin, 1968).

²⁰ The sole exception is the IRT, which classifies burglary and bodily harm as having virtually the same degree of severity.

²¹ The relevance parameter is unique to IRT analysis, which is why it can be defined for this weighting method only.

²² Federal Criminal Police Office, *Jahrbuch* (2010-2013).

Figure 2

Burden through everyday crime – three ways of weighting

Source: Bundeskriminalamt (2010-2013): Polizeiliche Kriminalstatistik. Bug, M.; Kroh, M.; Meier, K.; Rieckmann, J.; van Um, E.; Wald, N. (2015): WISIND-data files: Crime Survey and Weighting. Calculations by DIW Berlin.

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All three ways of weighting show similar distributions to the basic police statistics. However, the monetarisation process slightly dissolves the north south slope.

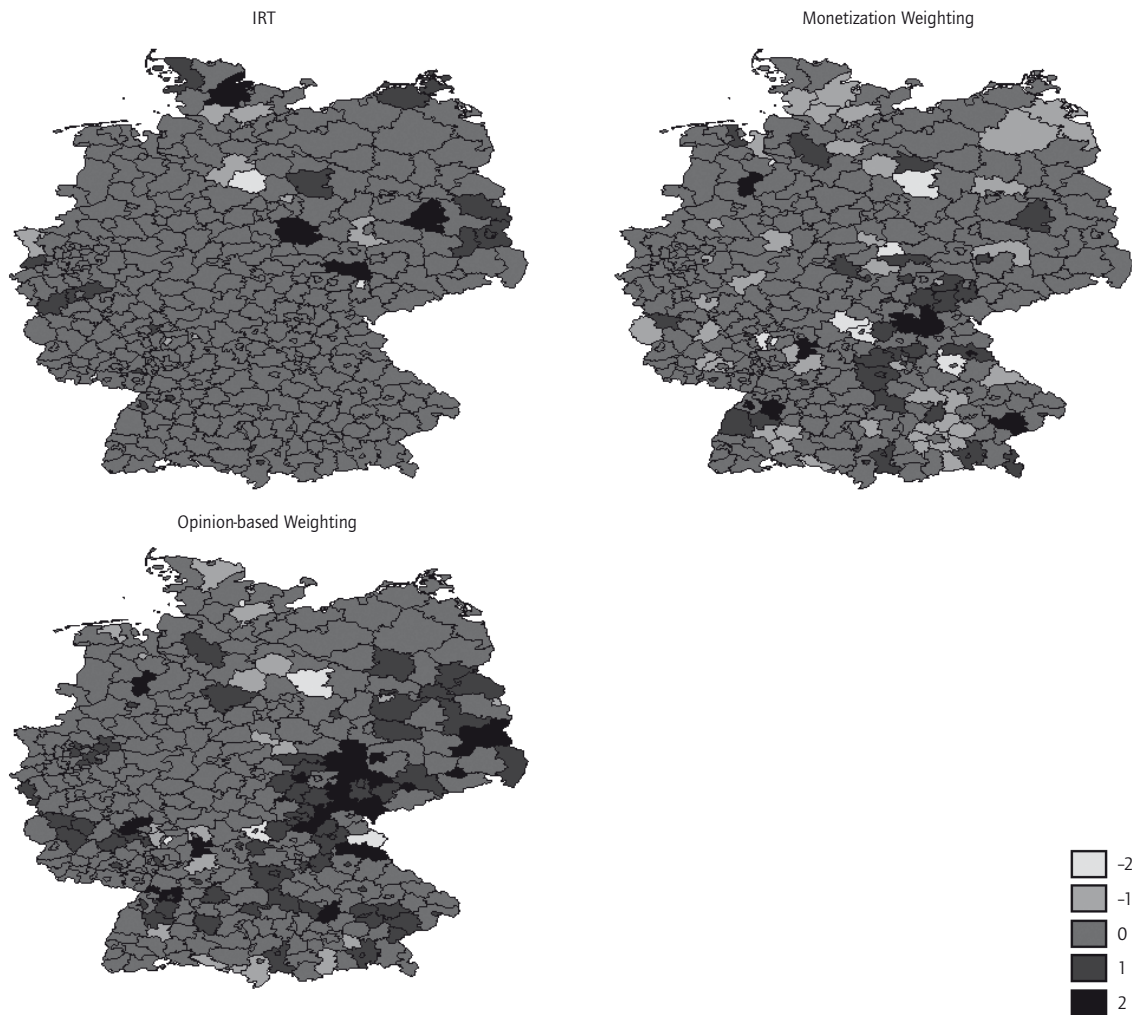
Similarly, the much-bewailed higher crime rates in the border regions to Poland could not be observed across all of the weighting methods. Indeed, the results of monetization and opinion-based weighting showed nothing to confirm this.

The similarity between the different methods may seem surprising at first glance, especially given the dissimilar weighting given to the various types of offense (see Table 2). Owing to the distinct frequencies of individual offenses, these differences are almost negligible in the

bigger picture. In the monetization weighting method, for example, the ratio of murder/manslaughter to theft is 1:0.0004; in relation to the weighted aggregates, this difference is less significant owing to the high frequency with which offenses such as theft occur (in 2013, a total of 2,379,091 incidents involving theft were reported in Germany, compared to as few as 2,119 cases of murder and manslaughter).

In other words, the results are affected most by those forms of crime that occur most frequently. This makes

Figure 3

Development of the everyday crime burden 2010-2013 (weighted calculation)

Source: Bundeskriminalamt (2010-2013): Polizeiliche Kriminalstatistik. Bug, M.; Kroh, M.; Meier, K.; Rieckmann, J.; van Um, E.; Wald, N. (2015): WISIND-data files: Crime Survey and Weighting. Calculations by DIW Berlin.

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The survey based weighting shows – in addition to the dark figure corrected but unweighted version – the strongest changes in the regional burden of everyday crime.

intuitive sense, since it is these offenses that produce situations of constant risk and less so crimes such as murder and manslaughter which, for all their severity, are few and far between.

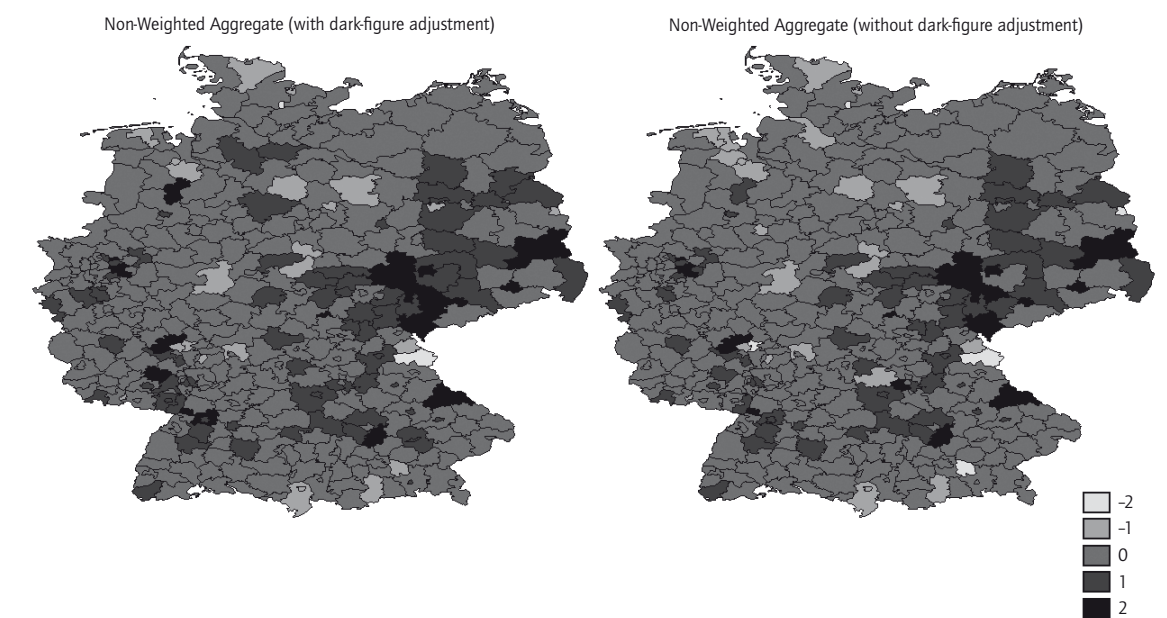
Crime Development from 2010 to 2013

Since the early 1990s, crime has been on the decline, with individual rates ultimately stabilizing — a positive development, particularly with regard to the fight against crime on the political stage. Figure 3 shows the corre-

sponding changes in crime rates measured between 2010 and 2013. Despite being slight on average, the changes observed are still very pronounced in some regions.

For each administrative district, the figures were calculated as the difference between 2010 and 2013 relative to the average value for the entire period $\left(\frac{\text{No. of cases}_{2013} - \text{No. of cases}_{2010}}{\text{Average no. of cases}_{2010-2013}} \right)$. The results obtained were then divided into five categories. Differences exceeding two standard deviations were classified as a

Figure 4

Development of burden through everyday crime (unweighted calculation)

Source: Bundeskriminalamt (2010-2013): Polizeiliche Kriminalstatistik. Bug, M.; Kroh, M.; Meier, K.; Rieckmann, J.; van Um, E.; Wald, N. (2015): WISIND-data files: Crime Survey and Weighting. Calculations by DIW Berlin.

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The dark figure correction highlights a worsening trend of the security situation.

“clear increase” (2), while a slight increase denotes a difference in the region of 1 to 2 standard deviations (1). By analogy, the categories “clear decrease” (–2) and “slight decrease” (–1) are formed on the basis of negative standard deviations. The category “No change” (0) refers to those values that lie between a negative and a positive standard deviation.

With regard to crime risk development, all of the measurement methods presented here give more or less a similar picture.²³ For most administrative districts, no or very little change was seen throughout the period of observation — official crime statistics (PKS) showed the same for the overall development of crime during the same period. Nevertheless, the three weighting methods displayed minor changes in the robustness of their categorization. While the IRT showed changes for a small number of districts only, the monetization method showed clearer differences in both directions (increase and decrease). The opinion-based weighting method, for its part, showed more districts

to have higher crime rates. An interesting finding is the near parallel results for crime development for the adjusted non-weighted crime figures, as well as for the opinion-based weighted crime statistics. In both cases, clusters of increased crime are evident in the regions of Brandenburg/Saxony, Thuringia / Upper/Middle Franconia, and Upper Bavaria as well as in parts of Baden-Württemberg.

Conclusion

The present report looks at two key shortcomings of Police Crime Statistics in Germany. First, an attempt to mitigate the problem with unreported crime (the “dark figure of crime”) was made using a victimization survey conducted by DIW. Here, a comparison of the results before and after dark-figure adjustment revealed no major differences in crime distribution. In addition, owing to criticism made of the PKS that it amounts to no more than aggregate non-weighted figures, the next step was to examine the impact of alternative weighting methods on crime risk assessment.

For all of the methods, two crime risk trends can be observed: first, a north-south divide, with the northern re-

²³ Note that, over time, the results of the IRT analysis are not directly comparable with the other two weighting methods, since the weighting parameters are re-estimated from the data provided each year using the IRT method.

gions displaying a higher risk of crime. Second, rural/urban differences, which can be accounted for by the higher levels of everyday crime affecting the population of towns and cities. Although the different weighting methods produce largely similar results, slight differences and changes are evident and are more meaningful in a state-to-state comparison rather than in a country-wide context.

In light of this, it will be all the more interesting to see what picture the crime risk indicators for 2012 and 2013

will paint. In these two years, the forms of crime also include Internet crime, personal threats, and violent extremism. In this context, detailed findings can be expected, particularly with regard to the urban/rural gap. This may even give a better insight into daily commuting between the city and the countryside.

Moreover, with the data findings of the DIW research project presented here, a subjective crime risk indicator representing people's fear of crime can be developed and compared with objective crime rates.

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8 QUESTIONS TO MATHIAS BUG

Crime Statistics: “Dark Figure” Survey to Correct Police Statistics

1. Mr. Bug, when measuring crime risk, what are the main problems that arise? The main problem with crime risk assessment is that we have to rely on data from the official German police crime statistics (PKS). These statistics are not without their problems, though, because they only contain data on crime that the police are aware of. The other problem with the statistics is that the numbers of individual offenses are simply added together. The picture that emerges is not properly weighted and might not depict the actual crime risk. Taking the PKS data as a basis, our aim is to incorporate the varying degrees of severity that the different offenses have.
2. What does that mean for the perception of official police crime statistics in Germany? The results of our poll show that people do distinguish between various forms of crime and rank them differently. They also reflect on the severity of individual criminal offenses. Respondents were asked what weighting they would give each offense. The findings are very similar to those resulting from the monetization method previously used in economic research.
3. Can you explain what the monetization method is? This is a method used in economic research in which each type of offense is assigned a monetary value. The central criticism leveled at this approach is putting a price on even a life or a murder. What we did, however, was standardize the “cost” of the damage. In other words, we set murder at the value 1 and the remaining offense categories as fractions of this.
4. What role is played by unreported crime or the “dark figure” of crime? The “dark figure” of crime is one of the main criticisms made with regard to the explanatory potential of police crime statistics. This figure varies from one offense to the next. The type of offense that is seldom reported to the police is, for example, petty crime, but also serious offenses such as domestic violence often go unreported. On the other hand, we have offense categories where the victims are compelled to file a report with the police, for instance, to be able to claim damages from insurance. This includes home invasion as well as everyday crimes such as car theft. What we noticed, though, was that even in the case of home invasion, the “dark figure” is very high, despite the fact that it is normally in the victim's interest to report a break-in.
5. How do you determine how high the dark figure of crime actually is? The only way to ascertain the extent of the dark figure is to conduct a large-scale opinion poll. This is necessary because only a small percentage of people will be victims of crime so you need a really large number of respondents to make sure your sample contains enough victims. Actually, with the 12,000 respondents in our study, we were still at the lower end of the scale.
6. How is crime risk distributed across Germany? Basically, there is an urban-rural gap, meaning there is more crime in urban areas than in rural regions. Crime that affects the individual directly—in other words, everyday crime—occurs more frequently in urban areas. There is also a north-south divide, with the northern regions being affected worse by crime than, say, Baden-Württemberg and Bavaria.
7. How has crime developed in Germany in recent years? In the past four years, the period covered by our study, crime in Germany has neither declined nor increased noticeably. The north-south divide has likewise remained more or less unchanged over recent years.
8. How can crime statistics be improved? One vital aspect would be to carry out a dark figure survey parallel to police crime statistics every year or two. This would be quite costly but would give a far clearer picture of the actual crime risk in Germany.

Interview by Erich Wittenberg.

German Construction Industry: New Residential Construction at Cyclical Peak— Public Construction Gaining Ground

By Martin Gornig and Claus Michelsen

The construction industry remains a key pillar of the German economy. According to the latest construction volume calculations by DIW Berlin, the value of construction in 2014 and 2015 is forecast to grow far more rapidly than the economy as a whole: by a price-adjusted 3.3 percent and 2.1 percent in 2014 and 2015, respectively. Currently, new residential construction is an important engine for growth with the construction volume in this sector estimated to increase by almost 12 percent in 2014, in nominal terms. However, 2014 will also mark significant growth in construction on existing buildings. In addition to gains in residential construction, more positive developments are also currently being observed in commercial and public construction, following declines in these sectors in recent years

However, although residential construction is stable, the high growth rates observed in 2014 are unlikely to continue into 2015. Fears that construction price increases would be (too) strong, precisely in this sector, are not supported by the national average. However, the dynamic growth of new construction is expected to tail off appreciably. Moreover, largely as a result of the gloomy economic outlook, the commercial construction sector is also likely to record only moderate growth in construction volume. The highest increases for 2015 are expected in the public construction sector—although the investment program announced by the government is in fact likely to have very little impact, even if further relevant measures are implemented throughout the year.

The construction industry has been a key pillar of the German economy in recent years. This is evidenced by DIW Berlin's annual construction volume calculations which, in addition to investment in construction, also include renovations that do not increase the value of the property.¹ As well as the construction industry in the narrowest sense, DIW's calculations also take other industries into consideration such as the manufacture of structural metal products and of prefabricated buildings, smithery, planning, and other services. Unlike the investment calculations published by statistical offices, DIW Berlin differentiates between new construction and refurbishment of existing buildings.

As well as documenting construction volume calculations for previous years, DIW Berlin also forecasts the equivalent values for the present and coming year (see Box 1). It has not been possible to date, however, to produce a forecast that breaks down the construction volume into new construction and construction work on existing buildings for each year. To gain a more accurate insight into current trends and to increase forecast quality, DIW Berlin has developed an indicator that allows for such disaggregation (see Box 2). The present report outlines the results of the indicator for the very first time.² The 2014 and 2015 calculations are based on DIW Berlin's economic forecasts as well as the findings and estimates from the most recent Joint Economic Forecast compiled in the fall by Germany's economic research institutes under the guidance of DIW Berlin.³

¹ See M. Gornig et al., "Construction in Germany: Structural Data on Production and Employment—2013 Calculations," report commissioned by the Federal Institute for Research on Building, Urban Affairs and Spatial Development (BBSR) as part of the Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety's (BMUB) research program, "Future Construction" ("Zukunftsbau"), Final Report (DIW Berlin, 2013).

² See M. Gornig et al., "The Development of a Refurbishment Indicator for Residential and Non-Residential Buildings," report commissioned by the Federal Institute for Research on Building, Urban Affairs and Spatial Development (BBSR), Final Report, (DIW Berlin, 2014).

³ See F. Fichtner et al., "Herbstgrundlinien 2014," DIW Wochenbericht, no. 38 (2014): pp. 871-899; Joint Economic Forecast Project Group, Deutsche Wirtschaft stagniert - Jetzt Wachstumskräfte stärken (Berlin: 2014).

Box 1

DIW Berlin's Construction Volume Forecast Methods

The forecast for construction volume is embedded in DIW Berlin's macroeconomic forecast.¹ Accordingly, in an initial stage, construction investment projections are carried out which can be consistently presented in the system of national accounts. Indicator-based statistical models are used for the construction investment forecast. For this purpose, the forecast value, e.g., the volume of commercial construction, is regressed on an autoregressive term and the lagged values of the relevant indicator. The forecast equation then generally takes the following form:

$$y_t = \alpha + \sum_{i=1}^n \beta_i y_{t-i} + \sum_{j=1}^m \gamma_j x_{t-j} + \varepsilon_t,$$

where y_t is the forecast value, x_t is the indicator, and ε_t is the error term. The parameters α , β_i , and γ_j are estimated.

The lag lengths n and m (years) are determined using the autocorrelation function and/or the cross correlation function. Furthermore, the different specifications are evaluated using standard information criteria.

The forecasting quality is evaluated using *ex-post* forecasts. The specifications with the lowest square deviation of the forecast values from the actual values are then used for the forecast.

Incoming orders and building permits for residential construction have proven to be suitable indicators for forecasting

residential construction, whereas for commercial construction, investment in capital equipment, capacity utilization, and incoming orders and/or building permits for non-residential buildings can be used.² Public construction, however, is not determined using indicators but is instead derived from the government accounts forecast which takes into consideration both government revenue and the announced economic stimulus packages.

The individual indicators sometimes produce very different results. Construction investment is also heavily influenced by legal framework conditions—the discontinuation of the home ownership allowance, for example—and these models cannot adequately depict changes in these conditions. Consequently, these statistical procedures can only serve as a reference point for the forecast. In a second step, results for the individual aggregates of construction investment are then aligned with the remaining aggregates of the national accounts.

In a third and final step, the forecast results are transferred to the model for the construction volume calculation. In addition, bearing in mind the specific characteristics of the non-intensive construction services, the demand-side trends in the course of the economic cycle are taken into consideration. So as to differentiate by additional structural features, more detailed information on building permits and current orders is used. This enables us to estimate different developments between the individual producer groups such as the core construction industry and finishing trades.

¹ On this method see, for example, D. E. Rapach and M. E. Wohar, "Forecasting the Recent Behaviour of U.S. Business Fixed Investment Spending: An Analysis of Competing Models," *Journal of Forecasting*, vol. 26 (2007): 33–51.

² See J. Döpke et al., "Indikatoren zur Prognose der Investitionen in Deutschland," *Kieler Arbeitspapier*, no. 906 (Kiel: 1999).

Renovation and Refurbishment Gain Momentum

After stagnating at around 182 billion euros for the past two years, the volume of construction on existing buildings increased significantly in 2014 (see Figure 1). DIW Berlin is forecasting 2.6-percent growth which is largely the result of the exceptional start to the year.

Residential construction has provided the strongest impetus with the volume of construction on existing buildings in this sector on a major upward trend for some years now. As there were no restrictions due to weather conditions last winter, construction companies were able to continue working throughout the entire year. In

addition to this one-off effect, however, the general conditions for residential construction investment also remain extremely favorable. Although the economic outlook has recently deteriorated slightly, the labor market situation is still likely to remain just as stable as income growth. Interest on construction loans will also continue to remain at historically low levels in future—this is indicated by the expected returns on mortgage bonds which have been steadily declining since the start of 2014.⁴ The improved financing conditions are also like-

⁴ The Bundesbank reports the returns on mortgage bonds differentiated by residual terms. The returns that are relevant here with up to ten years residual term are listed in Bundesbank time series BBK01, WX4260,

Box 2

Projection of Construction Volume on Existing Buildings

To estimate the volume of construction on existing buildings, data from DIW Berlin's construction volume calculations are combined with data from official statistics. Statistics referring to the number of employees subject to social insurance contributions are used in conjunction with construction industry statistics. Both sets of statistics are published with around a six-month delay, are available on a quarterly basis, and are also broken down into economic sectors. The official statistics provide six different time series per economic sector, which, when combined, describe the economic activity in that particular sector: the number of people employed in the sector, number of hours worked, number of companies, and company turnover.

Since it is not possible to know in advance what economic variables within the sector are particularly suited to ap-

proximating the volume of construction on existing buildings, a principle components analysis is conducted to bundle the information about the activities in the relevant economic sectors. This contributes to the robustness of the regressor since one-off effects which only relate to a specific variable but not economic activity *per se*, such as wage increases, for example, are filtered out. Further, the length of the time series used is also insufficient to include a larger number of variables simultaneously as regressors. The principal component analysis circumvents this problem. The missing data for the last two quarters of the current year are extrapolated using the seasonal pattern. As a result, the volume of construction on existing buildings is estimated for the current year. The volume of new construction is calculated as the difference between construction on existing buildings and total construction volume.

ly to provide fresh impetus for investment in construction on existing buildings, which is often less profitable than investment in new construction.

Figure 1

Volume of Construction on Existing Residential and Non-Residential Buildings

In billion euros at the respective year's prices



Source: Construction volume calculations by DIW Berlin.

© DIW Berlin 2015

The value of construction work on existing buildings is expected to increase by over two percent.

The rent cap adopted by the German cabinet, however, is likely to have been a source of irritation for investors, at the very least.⁵ For example, the distinction between “deep” and “simple” modernization measures is unclear. In the latter, the rent cap will be applied following modernization; in the former, it will not. The extent to which landlords can pass on the costs of refurbishment onto new tenants in the long term is also uncertain. It is possible that this will reduce the volume of investment in construction on existing buildings from 2015, at least temporarily.

Overall, a significant increase in investment in existing residential buildings was expected in 2014 against the previous year—a forecasted rise of 2.8 percent to almost 131.4 billion euros (see Table 1). However, the dynamic growth recorded during the first half of 2014 is not sustainable: there was subsequently a visible downward trend in the number of orders (see Figure 2).

In *commercial construction*, a considerable increase in the volume of work in terms of financial value on existing buildings was forecast. After a strong start to the year, a negative economic outlook had a dampening effect on companies' investment propensity during the remain-

⁵ See Draft Law on Attenuating the Rent Increase in Overstretched Property Markets and Strengthening the Purchaser Principle Regarding Estate Agent Services (Mietrechtsnovellierungsgesetz – MietNovG), Draft Law issued by the German government, www.bmjd.de/SharedDocs/Downloads/DE/pdfs/Gesetze/20141001_GesEBReg_Mietpreisbremse_Kab.pdf?__blob=publicationFile, in German only, last accessed on November 10, 2014,

Table 1

Structural Engineering Construction Volume

	2010	2011	2012	2013	2014	2011	2012	2013	2014
	In billion euros at the respective year's prices					Change on the previous year in percent			
New construction volume									
Residential construction	32.90	40.98	44.30	47.07	52.51	24.6	8.1	6.3	11.6
Non-residential construction	27.31	30.24	30.03	31.94	33.70	10.7	-0.7	6.3	5.5
Total	60.21	71.22	74.33	79.01	86.21	18.3	4.4	6.3	9.1
Construction on existing buildings									
Residential construction	118.87	123.86	126.98	127.83	131.40	4.2	2.5	0.7	2.8
Non-residential construction	55.59	57.86	55.55	54.09	55.33	4.1	-4.0	-2.6	2.3
Total	174.46	181.72	182.53	181.92	186.73	4.2	0.4	-0.3	2.6
Total construction volume									
Residential construction	151.77	164.84	171.28	174.90	183.91	8.6	3.9	2.1	5.1
Non-residential construction	82.90	88.10	85.58	86.03	89.03	6.3	-2.9	0.5	3.5
Total	234.67	252.94	256.86	260.93	272.94	7.8	1.5	1.6	4.6

Source: Construction volume calculations by DIW Berlin.

© DIW Berlin 2015

After two years of stagnation, construction on existing buildings is also profiting from the favorable construction economy.

der of 2014. This is illustrated both by industry association reports and by various business climate indicators.⁶ The *ifo Institute* business climate index, for example, has been on a steep downward decline since spring 2014 and recently reached its lowest point in two years. The unfavorable business outlook has also had a negative impact on incoming orders which have also been on a downward trend since spring 2014 in both the commercial structural and civil engineering sectors.

In contrast to residential and commercial construction, *public construction* in 2014 had a much more subdued start to the year. However, the volume of construction on existing buildings will also increase in this sector due to the improved financial situation, particularly at municipal level.⁷ The municipalities are, therefore, expected to at least start reducing the backlog of investment in construction on existing buildings that has accrued in recent years.⁸ Construction measures following the flood damage during the summer of 2013 should have added momentum in the second half of that year.

The bottom line is that the volume of construction on existing non-residential buildings—i.e., in com-

mercial and public construction—was predicted to increase by 2.3 percent to around 55.3 billion euros in 2014.

New Residential Construction Benefits from Favorable External Conditions

In the new construction sector, residential construction is currently profiting the most from the favorable external conditions: as well as the advantageous interest rate environment, another important contributory factor is that Germany has positive net migration, i.e., more immigrants are entering the country than emigrants leaving. This increases the demand for living space, particularly in metropolitan areas and induces increasing rents, which in turn is also an incentive for new construction activity. Furthermore, alternative investments continue to earn low levels of interest. However, the growing shortage of construction land in premium urban locations is increasingly subduing new construction.⁹ Nonetheless, after a good six-percent rise in 2013, new residential construction volumes were predicted to grow by over 11.6 percent to a total of around 52.5 billion euros in 2014 (see Figure 3).

The Phasing out of the economic stimulus programs in 2012 had a major dampening effect, particularly in public construction but, since 2013, the volume of non-residential new construction has been recovering. How-

⁶ See Association of German Chambers of Commerce and Industry (DIHK), "Konjunkturumfrage Herbst 2014, ZEW-Konjunkturerwartungen - Erster Zugewinn seit Jahresbeginn," press release, November 18, 2014; "ifo Geschäftsklimaindex erneut gesunken," press release, October 27, 2014.

⁷ Federal Ministry of Finance, "Results of the 145th Session of the Working Group for Tax Revenue Estimates, November 4-6, 2014 in Wismar," press release, no. 46, November 6, 2014.

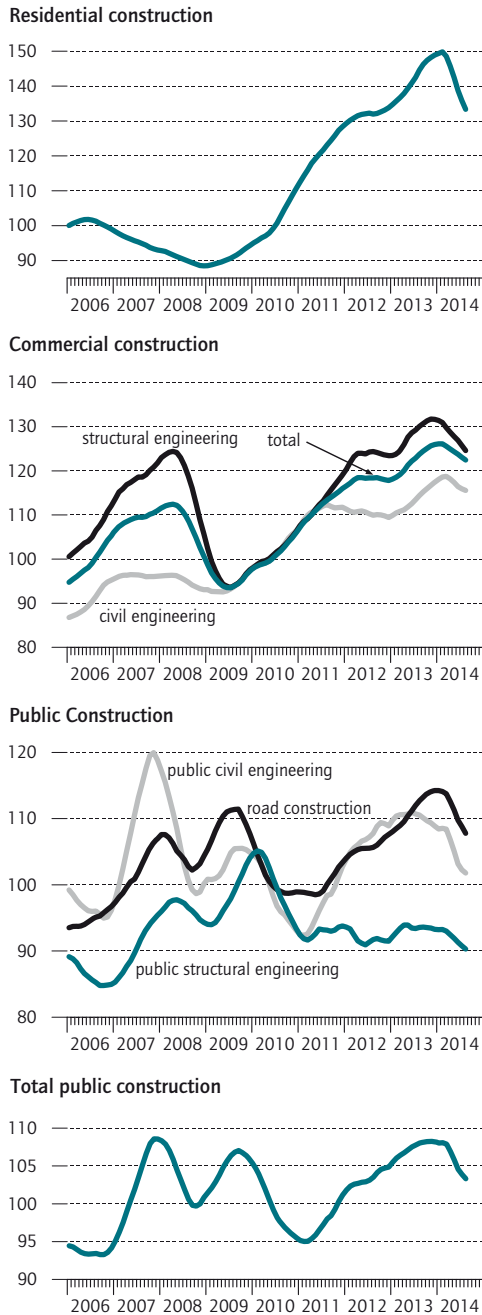
⁸ U. Kunert and H. Link, "Transport Infrastructure: Higher Investments Needed to Preserve Assets," DIW Economic Bulletin, no. 10 (2013).

⁹ This is reflected in the sharply increasing price of construction land in German cities.

Figure 2

Incoming Orders in Core Construction Industry

2005 value index = 100¹, trend components



¹ Seasonally adjusted according to the Berlin Procedure (BV4)

Sources: Federal Statistical Office; calculations by DIW Berlin.

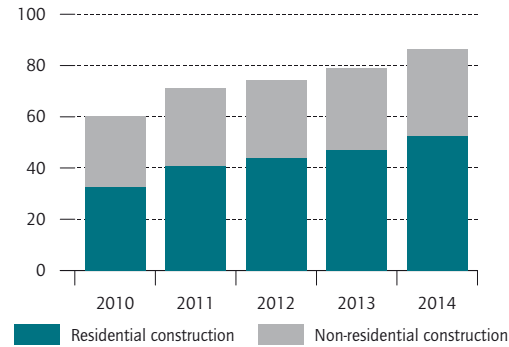
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Incoming orders are currently on a downward trend.

Figure 3

Volume of New Residential and Non-Residential Construction

In billion euros at the respective year's prices



Sources: Construction volume calculations by DIW Berlin.

© DIW Berlin 2015

The volume of new residential construction is currently profiting most from the favorable external conditions.

ever, the volume of new construction approved for 2013 is unlikely to be equaled in 2014. The uncertainty among companies due to the state of economy has had an impact on commercial construction specifically. Consequently, previously approved investment to expand production capacity may have temporarily been deferred. The commitment to providing childcare places, in particular, is also likely to have boosted new construction in the public sector. Overall, in 2014, the volume of new non-residential construction is likely to have increased by approximately 5.5 percent to 33.7 billion euros.

Moderate Growth of Residential Construction Costs

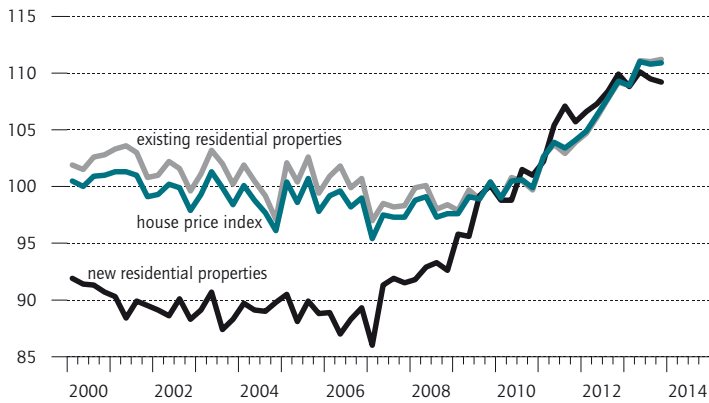
After the turn of the millennium, the German real estate market stagnated. However, the last five years have seen significant growth in property prices in many regions of the country (see Figure 4). This is frequently due to increasing demand—in the metropolitan areas, in particular, there has been considerable population growth. This is reflected in noticeable rent increases, which has made property market policy a popular election campaign issue. A cap on rents has since been endorsed by the German cabinet, with a view to curbing rent growth in overheated property markets.¹⁰ In order

¹⁰ For a summary and evaluation of the effectiveness of the regulation, see K, Kholodilin and D, Ulbricht, "Mietpreisbremse: Wohnungsmarktregulierung bringt mehr Schaden als Nutzen," DIW Wochenbericht, no. 15 (2014): 319-327; and C, Michelsen, "Eine Bremse, die nicht bremst," op-ed, Frankfurter Rundschau, September 31, 2014,

Figure 4

Real Estate Prices in Germany

2010 index = 100



Source: Federal Statistical Office

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Property prices have been sharply increasing for some years now.

to examine the causes of the housing shortage more closely, the Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB) established a committee of experts, the Alliance for Affordable Housing and Building. Another committee specifically created for this purpose will also analyze the development of construction costs and establish measures to ensure new construction, particularly in the low- and medium-quality segments. The German government's coalition agreement sees the role of the committee primarily as reviewing "(...) inflationary and excessive standards and cost of materials and processes, particularly in energy-efficient refurbishment."¹¹

However, lately, the development of construction costs has, for the most part, been unremarkable. Both material and labor costs have risen but only in keeping with the general price level (see Figure 5). Only recently, due to a significant increase in demand for construction services, costs rose more rapidly than general consumer prices. To cite this as the reason for creating a commission to slow down price inflation is therefore somewhat surprising—particularly because cost increases during an economic upswing, as was the case for residential construction in the last few years, are far from unusual.

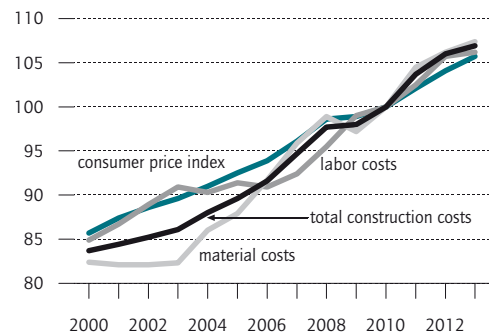
One possible reason for this being the subject of political debate could be a selective perception of the cost development of certain construction services.

¹¹ Coalition Agreement (2013),

Figure 5

Construction Cost Indices and Consumer Price Index

2010 index = 100



Sources: Federal Statistical Office; calculations by DIW Berlin.

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Only recently construction costs are increasing at a slightly faster rate than consumer prices.

There are actually substantial differences: for example, the cost of specialized construction services has increased much more dramatically, particularly in the fields of metal and glass work, plumbing services, fire prevention, and technical installations. In these fields, average annual cost increases have been significantly above the two-percent mark since the year 2000—and growth has recently accelerated (see Figure 6). Increases in construction material prices might help explain this. The price of metals, cement, and glass in particular increased sharply until 2010 (see Figure 7). On the other hand, the cost of traditional forms of construction has only increased moderately. The prices of earth moving, structural, masonry and concrete work, carpentry and timber work, as well as finishing work in general have seen only negligible rises since the turn of the millennium with an annual average rate of one to 1.5 percent, which is below inflation (see Figure 8).

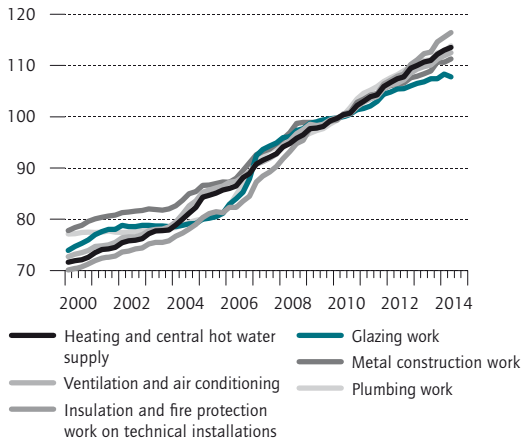
Trend Toward High-Quality Construction

Another factor affecting costs is the change in demand for certain locations and construction quality levels. Recently, estimated construction costs per square meter, in particular, increased much more sharply than the construction cost index for residential buildings. This suggests that investors are focusing on higher quality, especially when it comes to multi-family houses. Urban centers in particular have seen a rise in demand for living space—here, it is typically the small single-person households that dominate the real estate market with their growing demand for high-quality housing in cen-

Figure 6

Price Indices of Selected Construction Services

2010 index = 100



Sources: Federal Statistical Office; calculations by DIW Berlin.

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The cost of specialist construction services has increased significantly.

tral locations.¹² This has also forced land prices up. In the larger towns and cities in particular, the price of construction land has increased considerably over the past five years (see Figure 9). Construction cost indices do not take account of this factor despite its importance for the total cost of an investment.

2015 Outlook: Strong Increase in Construction Volume

For 2014, DIW Berlin has forecast a sharp rise in nominal construction volume of almost five percent to around 328.7 billion euros, compared with 2013 (see Table 2). For 2015, the expected growth is forecast to be slightly weaker than 2014 but still substantial at almost four percent, rising to around 341.3 billion euros. Moderate development of building prices is anticipated; in 2014, a 1.5-percent increase was expected and growth in 2015 is unlikely to be any stronger—forecast at less than two percent. The real construction volume—i.e., adjusted for price increases—is therefore expected to increase by 3.3 percent in 2014 and 2.1 percent in 2015. This signifies a slowdown in real growth which nonetheless remains at a comparatively high level.

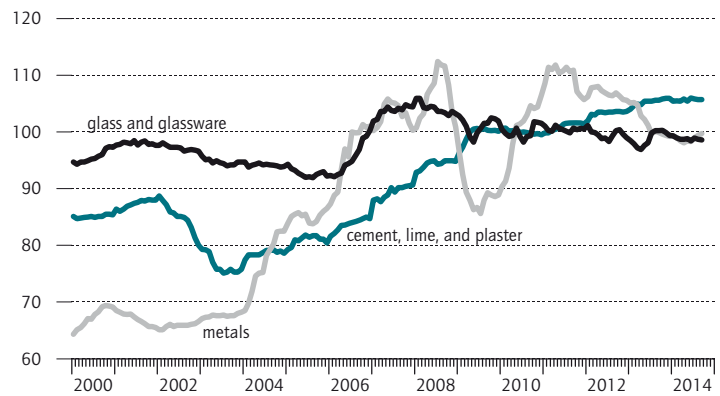
This trend is further substantiated by the development of the order backlog in the core construction industry which remains high in all construction seg-

¹² The demand situation is incisively summarized by the BBSR in a report by R. Müller and M. Waltersbacher, "Wohnungsengpässe in Ballungsgebieten," (Bonn: 2014),

Figure 7

Price Indices of Selected Construction and Raw Materials

2010 index = 100



Sources: Federal Statistical Office; calculations by DIW Berlin.

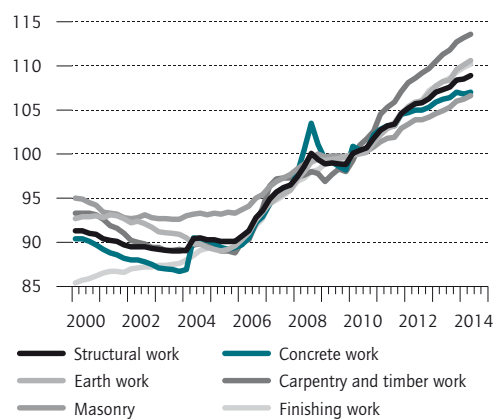
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The price of construction and raw materials has increased sharply since the turn of the millennium.

Abbildung 8

Price Indices of Selected Construction Services

2010 index = 100



Sources: Federal Statistical Office; calculations by DIW Berlin.

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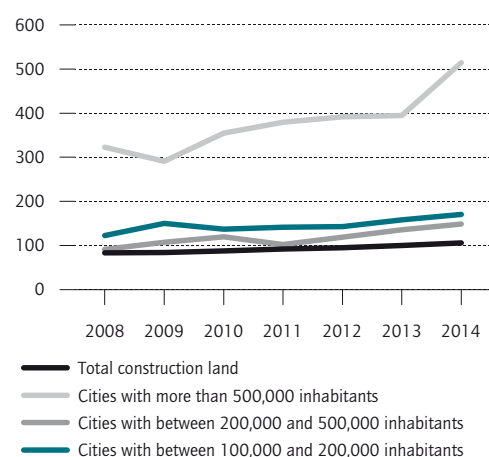
There has only been a moderate increase in the price of many traditional construction services.

ments, leading us to assume a continued high level of construction output until the end of 2014. However, there are early indications that incoming orders will follow a downward trend in the long term. The number of building permits issued also signals that con-

Figure 9

Prices for Construction Land by City Population

In euros per square meter



Sources: Federal Statistical Office; calculations by DIW Berlin.

© DIW Berlin 2015

The cost of construction land in large cities in particular experienced a strong increase following the financial crisis.

struction activity is likely to lose momentum in 2015 (see Figures 10 and 11).

While, as a result of its high starting point at the end of 2014, residential construction is expected to maintain

strong growth into 2015 (2.2 percent in real terms), the prospects for commercial construction are much more pessimistic. After recording a decline in construction volume in 2012 and 2013, the segment experienced a 2.7-percent uptick in 2014. However, this upturn is likely to be short-lived; the growth forecast for 2015 is only 0.7 percent. Given the currently less favorable economic outlook, we can expect companies not to remain reluctant to invest until the end of 2015 as a result of the slightly improved export prospects.

Real growth in the value of construction volume in the public construction sector will be more than four percent in 2014. As a result of the additional funds the German government has earmarked for infrastructure, civil engineering, already in a strong position, is also likely to exhibit robust development in 2015. There will also be additional resources from the fund established to address the flood damage which occurred in summer 2013. The recent announcement by the German finance minister that an additional ten billion euros would be provided for investment will have no impact, however, since this has only been approved for 2016 to 2018.¹³ Even if specific measures were to be adopted in 2015, they would initially be unlikely to have a positive impact on output. This is evidenced by experience of economic stimulus pack-

¹³ "Wegen schwacher Konjunktur: Schäuble will zehn Milliarden Euro investieren," Frankfurter Allgemeine Zeitung, November 6, 2014,

Table 2

Key Figures for Development of Construction Volume in Germany

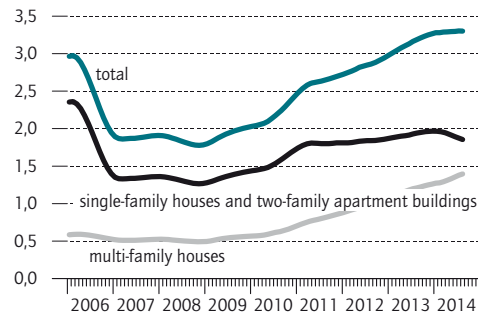
	2010	2011	2012	2013	2014	2015	Change on the previous year in percent				
							2011	2012	2013	2014	2015
In billion euros at the respective year's prices											
Total construction volume	283.30	305.73	309.37	313.60	328.65	341.33	7.9	1.2	-0.5	4.8	3.9
Price development	-	-	-	-	-	-	3.3	2.5	0.0	1.5	1.8
Real, chain index 2005 = 100											
Total construction volume	106.58	111.47	110.06	109.35	112.96	115.28	4.6	-1.3	-0.5	3.3	2.1
By construction sector											
Residential construction	103.44	108.64	109.99	110.26	114.01	116.52	5.0	1.2	0.2	3.4	2.2
Commercial construction	112.97	119.72	117.45	114.73	117.83	118.65	6.0	-1.9	-2.0	2.7	0.7
Public construction	105.76	106.05	96.53	96.13	100.26	104.88	0.3	-9.0	0.5	4.3	4.6
By producer group											
Core construction industry	99.63	107.32	105.30	107.65	111.29	113.85	7.7	-1.9	1.6	3.4	2.3
Finishing trades	115.59	117.43	115.09	112.46	116.22	118.67	1.6	-2.0	-1.9	3.3	2.1
Other construction services	103.04	108.80	109.01	109.02	112.47	114.45	5.6	0.2	0.0	3.2	1.8

Source: Construction volume calculations by DIW Berlin.

© DIW Berlin 2015

Construction volume is also expected to increase significantly in 2015.

Figure 10

Building Permits in New Residential ConstructionIn billion euros,¹ trend components¹ Seasonally adjusted according to the Berlin Proceedings (BV4).

Sources: Federal Statistical Office; calculations by DIW Berlin.

© DIW Berlin 2015

The volume of recently approved residential buildings is currently stable.

ages implemented in 2009.¹⁴ However, there is expected to be a marked increase in the volume of public construction in 2015: real growth of at least 4.6 percent is forecast.

The various construction segments are likely to benefit in equal measure from the forecasted developments in construction volume. The recovery of construction on existing buildings along with the continued stability of new residential construction figures in particular are evidence of this. In 2014, there is likely to be only one tenth of a percentage point difference between growth rates for

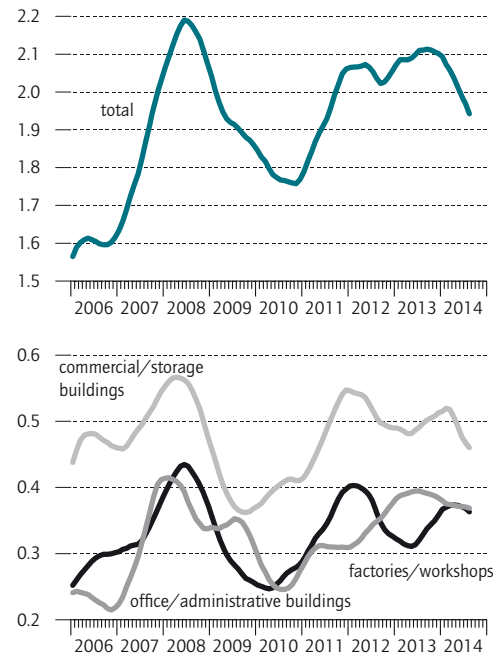
¹⁴ M. Gornig, H. Hagedorn, and C. Michelsen, "Bauwirtschaft: Zusätzliche Infrastrukturinvestitionen bringen zunächst keinen neuen Schwung," DIW Wochenbericht, no. 47 (2013).

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Keywords: Construction industry forecast, economic outlook

Figure 11

Building Permits in Non-Residential ConstructionIn billion euros,¹ trend components¹ Seasonally adjusted according to the Berlin Proceedings (BV4).

Sources: Federal Statistical Office; calculations by DIW Berlin.

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Building permits for production, commercial, and storage buildings are currently on an upward trend.

the core construction industry and the finishing trades (at a level of over three percent) and in 2015 two-tenths of a percentage point (at a level of over two percent). For other construction services, weaker growth is anticipated as a result of the downward trend in building permits.

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Erratum for DIW Economic Bulletin 1+2/2015, Table 5

Due to a technical error the table was mixed up.

Table 5

**Correlation between Personality Traits and
Intention to Study by Parental Education**

Coefficients from a linear probability model

	Non-academic background	Academic background
Conscientiousness	0.008	0.009
Agreeableness	-0.003	-0.042**
Openness	0.042*	0.019
Extraversion	-0.016	-0.015
Neuroticism	-0.070***	-0.039**
East (reference: west)	-0.092	-0.086*
Female (reference: male)	-0.117**	0.015
Migration background	0.072	0.033
Household income	0.011	0.095***
Place of living: urban	0.086	0.072*
Number of siblings	0.063	0.065**
Birth order	0.005	-0.040*
Standardized German grade	-0.075***	-0.037**
Standardized Math grade	0.003	-0.047**
Grade repetition	0.108	0.046
Constant	0.504	-0.019
Year dummies	✓	✓
Maternal personality traits	-	-
Observations	410	607
Adjusted R ²	0.031	0.076

Notes: Standard errors in parentheses.

Level of significance: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Source: Own calculations based on SOEP v30, Waves 2006-2013.

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Openness is of particular relevance for children from a non-academic background.